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DEATH OF MAJOR G. WARREN DRESSER.

Major G. Warren Dresser, the Editor of this Journal, and one of the best and truest of men, departed this life on the afternoon of Sunday, May 27. The funeral services were held at Newport, R. I., on Wednesday, May 30.

THE CINCINNATI MEETING.

The 9th, 10th, and 11th of May can be classed as red-letter days in the annals of the Western Gas Association, witnessing as they did the gathering together of the most largely attended and profitable meeting of gas engineers that has ever assembled at the roll call of this rapidly growing organization. If any fears had lurked in the minds of the members as to the unqualified success of their sixth annual meeting, and the solid and permanent footing which the Western Association is destined to maintain in the future, those doubts must have been pleasantly dispelled when, promptly at the hour of ten on the first day of the meeting, President Howard called the assemblage to order in the spacious parlor of the Burnet House. The intelligent and representative body of gas engineers there assembled furnished indisputable proof that this young but vigorous giant of gas associations not only lives, but is fast attaining a place in the category of kindred organizations second to none.

The ranks of the old members presented an almost unbroken front, the absentees being distinguished by the paucity of their numbers and the excellence of their reasons for an inability to attend. The accessions to membership may be pronounced one of the most remarkable features of the meeting, new faces being seen and welcomed on every hand. Looked at from a strictly business point of view, the meeting stands above criticism. At no previous gathering has there been such an interest manifested, and such a willing and concerted effort to impart information of practical value, as at the one of which we write.

In ready response to the calls made upon them, a number of the members, obedient to the dictates of duty and those kindly impulses which are such sovereign traits in the hearts of "gas men," presented papers for the consideration of their associates, which were distinguished alike for the ability of their authors and the solid kernels of valuable information which went to contribute to the knowledge of the members generally. It is a source of pleasure to us to state that no "beggarly array of empty chairs" greeted those who had so kindly volunteered to contribute to the success of the meeting by presenting essays, but, on the contrary, the attendance was at all times excellent, and the attention shown all that could be desired.

The inaugural address of President Howard was deservedly well received, containing as it did so many points of general interest to the gas manufacturer. A careful perusal has doubtless been bestowed upon it by our readers.

The papers presented, with the names of the authors, were as follows:

"The Construction and Management of Gas Works," by Gustavus A. Hyde; "Benches," by Thos. G. Lansden; "The Gas Stove," by E. J. King; "The Lowe Process," by Geo. B. Burns; "The Advantages of State Organizations," by Geo. G. Ramsdell; "The Bower-Grimston Regenera-

tive Gas Burner," by Geo. Shepard Page; "Some Observations on the Specific Gravity of Gas," by James Somerville; "Bench Furnaces—Regenerative and Recuperative," by John Gimper; "A New Mode of Purification," by S. H. Douglas; "The Electric Light," by Thos. Smith.

Full and free discussion followed upon the presentation of each paper, complete reports of which will duly appear in subsequent issues of the JOURNAL. The authors of the various papers certainly had no cause to complain of any lack of interest or enthusiasm which their remarks evoked, nor had they reason to bewail the absence of comment on the productions of their pen; but in every instance the utmost courtesy and goodwill was shown to the writer, even though his views may not have been in accord with those of a majority of his auditors.

The first day and evening, and a part of the morning of the second day, were devoted to the routine business of the Association and the reading of papers. In the meantime the committee selected to provide for the entertainment of the members had not been idle; and at 11 o'clock on the morning of the 16th carriages were in waiting preparatory to making a tour of the city and its suburbs. The Newport bridge was soon crossed, and the excursionists alighted on the historic "dark and bloody ground" of Old Kentucky, but nevertheless found the friendly hand of hospitality extended on every side. The large and prosperous establishment of the Cincinnati and Newport Iron and Pipe Company was first visited and carefully, though of necessity hurriedly, inspected. Thence the visitors were rapidly wheeled across the Licking river into Covington, where a short stop was made at the gas works, the order and neatness of which attested to the excellence management of their capable superintendent, Mr. Richard Salter. A delightful drive in mid-air over the Ohio, by way of Cincinnati's famed suspension bridge, was next on the programme, after which a tour was made through the coal and coke depot of the Messrs. Marmet & Co. Two hours were then devoted to a thorough and critical inspection of the works of the Cincinnati Gas Light and Coke Company, the unanimous verdict being that they are one of the few model works of the country. The cheap and systematic manner in which coal is received and handled, the wonderful and, to most of the sightseers, novel machine for drawing and charging retorts, known as the Ross steam stoker, the various styles of bench furnaces and settings, and, best of all, the superb engineering skill displayed in the admirable grouping and arrangement of the numberless forms of apparatus, elicited the warmest commendation of all. Superintendent Fullager is evidently the right man in the right place, and by his courtesy and zealous efforts for the entertainment and instruction of the guests, won the hearty goodwill of everyone present.

An elegant lunch furnished a fitting and happy finale to the tour of inspection, after which a brief call was made upon the busy establisment of the Stacey Manufacturing Company. Here were to be seen at every turn samples of the various patterns of iron supplies used in the construction of gas works, not the least noticeable of which were the immense yet gracefully proportioned wrought iron columns in process of manufacture for the new holders of the Cincinnati Gas Light and Coke Company.

The Taylor & Anderson retort, tile, and fire brick works next engaged the attention of the excursionists, and then a visit was made to the beautiful Zoological Gardens, of which the citizens of Cincinnati are so justly proud. In this lovely retreat was passed the rest of the too fast departing day, for the passing glimpses of fairy land which presented themselves to the delighted eyes of the spectator were found so enchanting that it was with evident reluctance that the members responded to the summons for taking their places in the carriages for the return trip. Before doing so, however, the visitors were again given an opportunity of satisfying the cravings of the inner man by indulging in a repast as sumptuous as it was appetizing, provided by the thoughtful generosity of their hospitable hosts. A business session in the evening concluded the events of the second day—a day long to be remembered by those in attendance upon the sixth annual meeting of the Western Gas Association.

On the third day morning and afternoon sessions were held, accompanied by the presentation of papers, after which miscellaneous topics of interest to the fraternity were discussed until the hour of adjournment arrived. In the evening the proverbial hospitality of the queen city of the West once more shone resplendent, and the guests, to the number of one hundred, seated themselves to a banquet as complete and elegant in all its details as a lavish hospitality and excellence of taste could provide. General Hickenlooper officiated as chairman and toast master, and by his ready tact and genial address at once endeared himself to the hearts of his audience. At 12 o'clock good night was said, leaving the recollection of the Association's successful meeting and Cincinnati's boundless hospitality lingering fondly in the memory of those who were so fortunate as to participate therein.

The local committee, consisting of Messrs. John Fullager, Henry Raushaw, and John Anderson, were indefatigable in their efforts to please, and too much praise cannot be awarded them for their courtesy and the uniform excellence of their arrangements. The details of the programme were carried out to the letter, and in such a way as not to trespass upon the time or impede the legitimate business of the Association.

We desire to extend our thanks to the members in general, and to Secretary Littleton in particular, for the many courtesies shown us during the meeting.

OBITUARY NOTE—E. S. CATHELS.

It is with sincere sorrow that we announce to the fraternity the death of Mr. E. S. Cathels, whose demise occurred at St. Paul, Minnesota, on the 30th of April. Mr. Cathels had, a short while ago, been appointed to the position of engineer and superintendent of the St. Paul Gas Light Company, and about two weeks after he had assumed the duties of his new position contracted a severe cold, which speedily developed into acute pneumonia. Despite the care and attention bestowed upon the sufferer, he was unable to recover from the shock, and fell a victim to the ravages of that fatal disease which spares neither the strong nor the weak. General Sibley, and the other officers of the St. Paul Gas Light Company, were unremitting in their attentions, and rendered every aid which could possibly have been extended.

Mr. Cathels' last moments were calm and peaceful; he was perfectly conscious of his approaching death; and passed away in such manner as might be expected from the just, upright and honorable way in which he had lived his life.

It is needless here to speak of the ability which had always marked his professional career—this is known to all; and while a blank will be caused in the ranks of our profession, and many of the fraternity will feel his loss as that of a personal friend, how much greater will be the poignancy of the grief of those who have, by his seemingly untimely taking away, lost a husband and a father. The woe of his own domestic circle will, however, be in a measure comforted by the reflection that his career, while with them, was stainless, bright and true.

Mr. Cathels, besides being a prominent and respected member of the American Gas Light Association, was a member of the Institute of Civil Engineers, as also of the Society of Engineers, of Great Britain.

The Petroleum Outlook.

The statistics which we present in the present issue deserve, we think, more than usual attention from the trade, as they indicate changes of more than usual importance. The period of excessive supply is quite probably at an end, at least until some new large field—not now in the producer's horizon—shall be discovered. There is greater warrant to-day for permanently better prices for crude than we have had for the past four years.

The production of the Bradford and Allegheny field continues gradually but certainly to decline, and the boundaries of these fields are now beyond all doubt clearly defined. In the Forest and Warren districts the number of dry holes show the treacherous character of the territory, and the drilling for the past month has gone far to indicate the limit of the field. In the Butler field all the efforts to increase the production or to extend the area have failed. None of the results of the wild cat ventures in Elk county or elsewhere have been encouraging to their projectors.

During the past month there have been developed, among other things, these six significant facts:

1. A larger percentum of dry holes than we had in any month for seven years.

2. A less number of drilling wells than for any corresponding month since 1875.

3. A less number of new wells completed than for any corresponding month in any year since 1876.

4. A less daily production than in any corresponding month since 1878.

5. A larger shipment from the producing region for the month than for any corresponding month since the petroleum trade began.

6. The first month since October, 1878, in which the stock of petroleum in the region has been reduced.

It should be noted that the decreased number of drilling wells must not be attributed to any conservatism in the producer. Such conservatism does not exist. As long as the producer can find area for activity he will drill with little regard to over-production or low prices, and he will limit this activity, as he does at present, only when he knows of no promising territory upon which to exert it.

The artifices by which market values are manipulated are far stronger now than they used to be, and the speculative influences are far greater. These may for a time interfere with the natural influences of a continuous decline in production, but they cannot in the long run overcome them. If, as appears evident, we have passed the turning point of over-production, permanently higher prices must before long be the result.—*Stowell's Petroleum Reporter.*

The Management of Small Gas Works.

By C. J. Russell Humphreys.

[Continued from page 220.]

Much diversity of opinion exists as to the best size and form for retorts. For small works, we do not think it is well to employ those of large dimensions, because with a light demand for gas they would not be fully utilized. A retort 15 × 26 inches, D-shaped, with rounded corners, is a very good style. The oval or round form will last longer than the D's, but do not give such good results while in action. Irrespective of shape and size, the very best retorts should be purchased. Under no circumstances should inferior fire stock be bought. The best is the cheapest.

For furnace walls, our preference is the special fire block made for that purpose, measuring 12 × 18 inches. As red brick quickly disintegrates, when exposed to the direct action of the flame, two courses of fire brick should intervene between the red brick and the fire.

We think it poor economy to build the vertical flues or chimneys of a bench with any other material than fire brick. We have already indicated our preference for the bridge-wall setting, particularly when there is an open space at the rear of the stack. In back-to-back benches, this form frequently entails a great deal of vexatious trouble, owing to an accumulation of clinker which forms at the inlet to the horizontal flue at the rear of the setting. Some engineers have attempted to overcome this evil by making a pit at this point, working on the supposition that this hole will not become filled before the end of the life of a retort. The theory not only seems plausible, but, as far as our information goes, is perfectly sound. In other settings, where the upper retorts are supported by tiles resting on the lower ones, it is well to build up a 4-inch wall at the rear, encircling the ends of the retort at that point. By this method the lower retorts are relieved in great measure from the weight of the superincumbent material.

There is also a vast difference of opinion as to the quantity of tiles a bench should contain. Some hold that a retort needs very little support, and that a superfluity of tiles means a large fuel account. Others make their contention for thoroughly protected and perfectly supported retorts. Our own idea inclines to the happy medium, shielding the retort directly over the fire, if *high* heats are to be employed, and providing two supports between the front and rear wall. As to the bearing of this matter on the fuel account, it would seem that the heavier a setting is, the longer it will take to heat it up; but after the carbonizing temperature has once been reached, no extra coke will be required to maintain it there. In the small oven of two retorts, in our imaginary works, we will employ the minimum of fire stock, because we have designed it for intermittent use; we, therefore, want to be able to raise the heat on it as quickly as possible.

A point of prime importance in building benches is to have the joints as thin as possible, 10 joints to the inch should be the rule.

We see no good reason why iron retorts should be employed, save in the very smallest works, as the fire clay ones have the advantage in almost every particular. The opinion is frequently held that where a bench has to do intermittent work, clay retorts cannot be employed on account of the injury done them in firing up and letting down. We are inclined to think that, if care be exercised, clay retorts suffer no injury during the cooling process. We would, in this connection, say that the retorts should be thoroughly cleared of carbon before a setting is allowed to cool down. If this is not attended to, the retort will crack as the heat drops owing to the irregularity in the rate of contraction between the clay of the retort and the carbon. For removing carbon from retorts, there is no method comparable with the steam process. This plan is extremely simple, the rationale being that air is drawn in by means of a steam jet through an iron pipe; the combined air and steam strike against the carbon and quickly burn it off from the retort. By the use of the jet once a month, for two or three hours, the retorts can be kept free from this deposit. When steam is not to be had, the same object can, in a measure, be secured by the use of a row of fire clay pipes stretching the length of the retort and passing through the lids of the mouthpieces. Of course, a special lid has to be made for this purpose with a hole cut in it to allow of the clay pipe passing through. The plug at the top of the stand pipe being removed, a current of air is created, passing through the clay pipes to the back of the retort, then forward through the latter and up the ascension pipe. Another plan for removing the carbon is to dispense with the clay pipes, and merely place a lid on the mouth-piece, loosely leaving an opening at the bottom. The ascension pipe plug is removed as before, by which means a current of air is drawn through the retort. This latter is the least efficient plan which we have noticed for removing carbon. Of these different modes of removing this retort house bugbear the first named is undoubtedly to be preferred, because it does the work in a much shorter time, and leaves the retort in better shape. Several years ago it was the custom to remove the carbon with heavy bars. We trust this method is not pursued at any works to-day; if so, would recommend that it be discontinued forthwith.

A very good mixture for patching retorts, after they have been "scurfed," is made of two parts, by weight, of Kaolin, two parts of fire clay, 1½ parts of abestos retort cement, and ½ part of borax. A full assortment of patching tools should be at hand. These may be of various sizes and shapes. The handiest form will be a flat iron tool, 3 inches wide, 4 inches long and 1 inch thick. The handles of these patchers can be made of ½ inch pipe, as it is not necessary to have them very heavy.

It is an excellent plan to give the retorts a coating of thin clay before putting a fire in the furnace. If the bench is a sufficient distance from others in action, the better way is to send a lad in the retort, and let him apply the mixture with a whitewash brush. He can also, with the aid of some heavy clay and a trowel, point up any cracks in the retort. If the setting be too hot to admit of this method of working, a brush can be made fast to a 10-foot pole and the whitewash applied in this manner.

There are one or two other points in regard to the setting which it may be well to mention. Thus, every crack and crevice in the brickwork should be pointed with fire clay, because such openings, insignificant as they may appear, are very conducive to poor draughts. The flues should be kept well cleaned out. Of sight-holes it is easily possible to have too many; two for a bench of fives will suffice, the plugs for these to be preferably made of fire clay.

Several different kinds of tools are used for cleaning the stand-pipe. Some superintendents use a bent auger, about 3 inches wide, while others employ a plain iron plate of the same size attached to the end of a bent piece of ¾ inch iron, about 5 feet long. A retort should never be charged until the stand pipe is cleared. Sometimes stoppages occur too high up in the pipe to be reached by this tool; in such an event, the plug at the top will have to be removed and a clearing rod inserted at that point. The plugs or acorns of the ascension and dip pipes should have heavy knobs cast on them to facilitate their removal. Under no circumstances should fire clay be used for the joints when replacing the plugs, as the heat will bake the clay and make it very difficult to remove the acorns; common luting is all that is necessary for the purpose indicated.

One word relative to the duration of the charge. Where generator furnaces are employed, it is feasible to burn off even 300 pounds of coal in three hours; but with the common mode of heating benches, it is folly to work anything less than four hour charges. It is true enough that very little gas is given off during the fourth hour; but, on the other hand, this extra time is needed for getting up the heat for the new charge. Too much stress cannot be laid on having a sharp heat on the setting at the time of charging.

We think there is little room for doubt as to the desirability of removing the dip seal, but it must be admitted that it is still an open question, which is the best appliance for securing the object sought. As already stated, in our imaginary works we have provided each dip pipe with a by-pass, consisting of a 2 inch cock, the plug being made of brass, the barrel of iron. This cock will be worked from the floor by means of a lever. In some cases where this mode of dispensing with the dip is employed, the cock is so fitted with a counterbalance weight that it is self-closing. When the retort is charged, and the lid in position, the lever attached to the opposite end of the cross-head of the plug from the counterbalance weight is drawn down and hooked to the lug of the lid. This method of working has the advantage that there is no possibility of a by-pass being left open accidentally; but as an off-set to this point, the counterbalance weight causes the cock to wear out much more quickly than it otherwise would. We will, therefore, dispense with all weight and use merely the connecting lever.

We would remark here that the main reason which has induced us to adopt the foregoing style of anti-dip, in preference to one of the many patented inventions, is that it is much cheaper. The cost of the material is less, and it can be fitted up by any ordinary mechanic.

[To be continued.]

The Lighting of the East River Bridge.

The lighting of the great suspension bridge over the East river by electricity has so far at best been a very dismal affair. The roadway for foot passengers, where one would suppose the most urgent need for proper lighting existed, is really the darkest part of the structure. The great network of wire ropes overhead is brought out very clearly; but the traveler on foot requires to pick his way cautiously. We have no hesitation in saying that the same number of Siemens burners would accomplish the lighting of this wonderful piece of engineering skill in a much more satisfactory manner. Another very noticeable defect in the lighting system is the frequency with which extinctions occur. The electric light people say that these extinctions arise from the vibratory motion of the structure bringing the carbon points in contact.

[Official Report.—Continued from page 226.]

Sixth Annual Meeting of the Western Gas Association.

Held at the Burnet House, Cincinnati, Ohio, May 9, 10, and 11, 1883.

First Day—Morning Session—May 9.

READING OF PAPERS.

Mr. G. A. Hyde, of Cleveland, Ohio, read the following paper on

THE CONSTRUCTION AND MANAGEMENT OF GAS WORKS.

I would not presume to prepare a paper on this subject except for the purpose of bringing it before the Association for consideration and discussion, believing that it would be of interest and advantage to every member present. Any ideas that I may advance may be neither new nor useful; but if I shall succeed in bringing out the ideas and experience of others I shall have attained my object.

Since I contemplated writing a paper I have been pressed with business, and I now find it impossible to give the subject the attention I desire, and which it deserves; and I shall excuse myself from attempting to give details of the construction of gas works, but will call your attention to some general points which occur to me.

The site for a gas works should be on as low a level as any portion of the city or town to be supplied with gas, providing it is above any possible flood, the necessity for which the experience of many cities and towns in this State during the past winter is sufficiently convincing. If possible, such works should be located alongside of or near to a river, canal, or railroad, to facilitate and cheapen the cost of the delivery of coal, and the shipment of coke and tar. The ground should be as level as possible, and ample, in the first purchase, if attainable at reasonable rates, to avoid the necessity of purchasing at exorbitant prices when the works shall require extending. An abundant supply of water and proper drainage should not be lost sight of in selecting the grounds.

In planning the arrangement of buildings, holders, etc., space should be allowed for the extension of the retort house and purifying house, and for the erection of several holders. All buildings should be nearly fireproof. The framework of the retort house should be of iron, covered with iron or slate; and other roofs, if of wood, should be covered with iron, tin, or slate. I believe that the framework of a large holder-house roof should be of iron covered with sheet iron, in preference to a wood frame covered with slate.

In the construction of benches, economy of fuel can be obtained if the walls of the furnace are made plumb instead of flaring, and the width of the furnace limited to 12 inches and the length to 3 feet 3 inches between the furnace door and the end of the grate bar; and further economy can be effected by dispensing with the tile under retorts, except under retorts directly over the furnace, and unnecessary width of arch and saddle tile between retorts.

Great economy in fuel is claimed by the use of the regenerative furnace, but of which I cannot speak from experience, as I have never used any of the many methods. From present information, however, there remains considerable doubt whether the extra cost of construction, and the difficulty of controlling the heat, would warrant its use in preference to a model bench on the old pattern.

I consider it desirable to erect a stack to every four benches, when built in double rows, and have them extend up a few feet above the ventilator. I believe this method is preferable to the short stack which is often used, securing better draught and conveying out of the retort house the heat and deleterious gases of the furnaces.

Retorts 9 feet long are preferable to those 8 feet in length, and over 24 inches wide rather than less. For charging retorts by hand, I prefer the double shovel system rather than the single shovel or long scoop. For fuel for heating retorts, coke is usually the better; the heats can be kept up with coal equally well and as easily as with coke, if the coal is of the right quality, and if it is lump, free from slack. The economy of using either depends upon the selling price of coke and the purchasing price of coal.

The bridge pipes to retorts should be straight, not curving, with opening and stopper at the angles, to allow of easy cleaning. The unsealing of the dip pipes is an important operation in securing free passage of the gas into the hydraulic main, and any of the methods in use to accomplish that result are desirable. Self-sealing lids are preferable where an exhauster is used.

The first apparatus that the gas should pass through, after leaving the hydraulic, is the tar extractor. It should be located near the benches, so that the tar can be removed while the tar is hot, on the principle of friction, and not cooling. Next in course should be the exhauster, an essential and important machine in a large works to secure large and economical yields. The exhauster should be controlled by a steam and gas governor. Duplicate exhausters and engine to run them are desirable to guard against accident. The pressure of the gas at the retorts should not be above 0.

Immediately following the exhauster should come the multitubular air or water condenser, to cool the gas and remove, as far as possible, any trace of tar still remaining in the gas. The pipes composing the condensers should be arranged in series, and each series, when performing its maximum work, should pass a given amount of gas; and with any increase or decrease in the gas make a series should be turned on or off. This will insure a nearly uniform velocity to the gas in all the series, and a uniformity in the working results. To illustrate, each series might be expected to pass, say, 100,000 cubic feet of gas per day, and when the make exceeds that amount another series should be turned on. This method of duplicates should be applied in the construction of the tar extractor.

A scrubber or washer of some form should follow the condensers, and secure all the ammonia remaining in the gas; and of such strength as will be desired for the ammonia works. There are a number of patent methods of performing this work effectively; but, in the absence of any patent machine, two scrubbers, of 30 to 35 feet in height each, will be reasonably efficient. These scrubbers may be filled with slats or brush, but brush is the more efficient and cheaper. The first scrubber should be supplied with the ammoniacal liquor from the tar well, collected from all the apparatus preceding the first scrubber. In passing through the first scrubber the strength of the water will be increased to about 8 ounces, or 4° Twaddle. The gas should then pass into the second scrubber, which is supplied with fresh water (say about 1¼ gallons per 1,000 cubic feet of gas), which will free the gas of nearly all of the ammonia. The water from this scrubber should flow to the tar well, to be used with the liquor collected from all the other apparatus, in the first scrubber.

Next in course are the purifiers. I favor what may be called small purifiers—say about 10 by 16 feet, erecting sets as they shall be required. For purifying material white lime and oxide of iron, prepared in numerous forms, are now generally used—the cheapness of either material being generally the consideration governing the choice.

With station meters, as well as with all the other apparatus of a large works, I believe in duplicates of moderate size.

In the construction of a gasholder tank, when the excavation is to be very deep, or where not so deep but with a tendency of the earth to cave from presence of quicksand, it is better to sheet-pile a trench for building the wall, and make the center excavation afterward. Where the excavation is in gravel, and there is an abundance of water, a line of drain pipe should be laid on the outside and inside of the footing, with branches from the inside line to all springs on the inside of the tank; and the two lines of pipe should be run to a pumping well constructed on the outside of the tank wall. With this preparation, all the work of constructing the wall and covering the bottom can be done without the least annoyance from water. A vent-hole should be left over the main inside drain pipe, covered with a self-acting valve, so that in case the pumps should give out the water would not lift the bottom. After the erection of the holder, and everything being in complete working order, the stream from the pump should be turned into the tank until it is filled to the proper height.

Gasholders should be housed in localities where snow and very cold weather prevail, to escape the trouble and expense of removing snow and ice from the holder and tank.

With gas in the holder, some governor is required to control or regulate its delivery to the street mains. A number of devices have been patented for this purpose, all of which have more or less merit; but the one that will perfectly and automatically regulate the distribution of gas, under all the varied conditions that attach to the flow of gas from the holder to the consumer, is the governor or regulator that gas managers are looking for.

Throughout the entire works, from the retorts to the governor, there should be facilities for cleaning every pipe at a moment's notice; every pipe at every bend should have a flanged opening, covered with a blind plate; and every apparatus should be provided with a by-pass.

To convey the gas from the holder to the consumer requires a judicious arrangement of street mains, in size and location, to the end that heavy pressure be not required at the governor to secure a fair pressure to the most remote consumer. The street mains should be laid on grades, and with great care, and usually about four feet below the surface of the street. Joints should be of lead, not less than 2½ inches deep.

Drips—a necessary attachment to street mains—should be placed as seldom as possible, and a careful record kept of their location. The most effectual and convenient method of collecting drips from street mains is by the use of a short section of pipe, of the size being laid, about 18 inches in length, having just back of the socket a slotted chamber 1 inch wide, 2 inches deep, and 2 inches long, which when laid would have the slotted chamber on the under side of the pipe, and would catch the drip water as it runs along the pipe. From this chamber a ¾ or 1-inch pipe would convey the water to a pot set at the curb line, from which a standpipe should extend to the surface of the ground for attaching a pump. This method is simple, strong, and efficient, and, with a few of each size on hand, an unexpected occasion for placing a drip connection would be provided for.

All consumers' service pipes should be covered with a good coat of paint, and dried before being laid. A stopcock should be placed at the curb line, covered with a durable and convenient iron box. This method of securing a means of shutting off the gas is indispensable in case of fire and for non-payment of bills. It is advisable, in these days of cheap gas and increasing consumption, to lay large pipes for consumers. In localities where there is clay, coal cinders, or other inequalities in the ground, the service pipe should be laid in pitch or water lime, to protect it against the action of acid or sulphur. The standpipes to lampposts should be large—even to one inch diameter—to provide against stoppage by frost. This is almost a sure cure for that trouble.

I believe I have called attention to nearly all the items of construction, and will now make some suggestions in reference to the running or management of the works.

As far as possible, always keep in store a good supply of dry coal of best quality. Run good heats—not too high, or else the gain in quantity of gas will be more than offset by the early destruction of the retorts and arches. Let there be no leaks about the gas works. During the early part of the summer clean every hydraulic main and gas main about the works, condenser, washer, etc., and any pipe that ever gets obstructed with naphthaline or tar, and wash out the station meters. Examine all the street mains thoroughly every spring as soon as the frost is out of the ground, and again in the fall of the year, for leaks, and make thorough repairs when they are found. If a main is leaking badly, on account of poor joint-work in laying, it is better to relay the pipe rather than to subject it to continual repairs. Do not permit from 10 to 40 per cent. of the gas made to be lost, but reduce it to 6, or even 4 per cent.

Every superintendent should see to it that there is a plan of the locations of the street mains and drips, and also a perfect record of the working of every department of the works.

Discussion.

Mr. Fullager (Cincinnati)—Mr. Hyde speaks of the importance of locating gas works in the lowest part of a city, in order to insure a good supply of water. I think he must commend the situation of our works in Cincinnati in that respect, since it was our fortune, for about two weeks, to have 15 feet or water flowing over us. We had no use for such an abundant supply.

Mr. E. J. King (Jacksonville, Ill.)—Mr. Hyde speaks of coating his service pipes. I would like to ask him what he has found to be the best coating for pipes.

Mr. Hyde—We use a mixture of white and red lead, with oil.

Mr. King—Some parties have advised me to use pitch softened with naphtha.

Mr. Hyde—We have tried that, but prefer to use a mixture of white and red lead. It lasts forever; there is no wear out to it.

Mr. King—You spoke of placing the tar extractor close to the hydraulic main. Do you put it before or after the hydraulic main?

Mr. Hyde—Before.

Mr. King—I suggested making that change in our works, but the men all opposed it, claiming that a great deal of trouble would result. They claimed that there would be more or less stoppage.

Mr. Hyde—The tar extractor should be kept hot. It should be encased, so as to be protected from changes of temperature. There will be no trouble if it is kept hot.

Mr. James Somerville (Indianapolis, Ind.)—I did not quite understand Mr. Hyde as to the construction of gasholder walls and tanks which he recommends. He talked about pumping the water away through certain drains, and then building the tank wall over the foundation that was being freed from water. It seems to me that that would be rather a dangerous proceeding; but I may not quite understand his position. Surely, as you take the water away from under ground like that, some subsidence must take place. If I understand him, he builds his wall right over the ground from which the water has been drawn. I would like to hear from him further on that point. Another statement was made by him to which I wish to refer—as to street boxes. I sometimes question the utility of them. I generally find, in case of a fire, that they will not turn off. Oftentimes they stick. Instead of shutting the gas off in the street, I think it better to go into the house and remove the meter. Then we have the meter in the office. If we have a stopcock in the street, and shut it off, we sometimes do not know wether we have a meter in the house or not. I would like the opinion of the members as to the street boxes. It has occurred to me that there is no utility, and sometimes a positive hindrance, in having them.

Mr. Hyde—I will explain my statement with reference to draining about the gasholder. I had in mind the construction of a gasholder tank where there was an abundance of water. It was necessary that from 8,000 to 10,000 gallons of water should be taken out of the way in order to construct the tank. It was to be constructed in a valley, below the river; the water was in the way, and there seemed to be no way to build the wall. I was called upon to advise some way of overcoming the difficulty. The water was flowing in at the rate of 10,000 barrels per day. It was necessary to keep a large pump, carrying a four or six inch stream, running all the time in order to carry the water off. To accomplish the work successfully, I laid a drain pipe around what was to be the foundation of the wall. I started with a 10 inch pipe at the well, on the outside of the wall, and reduced it to 6 inches, and finally to 4; and then went around on the other side; and the two pipes came near together on the outside. Then I dug a trench on the inside (the pump was going all the time), and laid the same size of pipe. Then I laid the foot stone of the tank wall, and there was no water visible. We covered up the sewer pipe as it was laid, putting coarse and fine stone at the joints. When the foot stone had been laid you would not have known that there was a particle of water there, although they were pumping out 10,000 barrels per day. I noticed several places where the water had been coming out, and I made a little excavation, but could not bail the water out there. Then I laid a drain pipe up to the spring and covered it over; and there was then no water to be found there. When we carried the wall up there was no water; and when we concreted the floor of the gasholder tank there was no water visible. Still, 10,000 barrels per day were being pumped out all the time. The tank wall was completed, the concrete put over the floor, and, at the junction of the two pipes (one on the inside and the other on the outside of the holder), before they passed into the well, I left an opening 10 inches in diameter, so that in case the pump should stop the water would not lift the bottom out. The floor was completed, the pump was stopped, the water came in, and we let it stand until the time came for putting in the gas holder. Then the pumps were started, and were kept going while the men were at work on the gasholder tank. When everything was complete and ready for letting the water in, the outflow from the pump was turned around into the tank. I was not there at the time, but I was told that just as they were turning the spout around to turn the water in the pump broke, and of course the very thing occurred which I had been trying to guard against—and that was the lifting up of the bottom. That resulted from the breaking of the pump. They repaired the pump, and again, when the the time came, they turned the spout around and filled up the tank; and it has been going all right ever since. It was built while 10,000 barrels of water were running through every day.

Mr. S. H. Douglas (Ann Arbor, Mich.)—I have had a good deal of experience in building where a large quantity of water was encountered. In one case I encountered a spring below the bed of the river, where the water came in on a level. The circumstances were very similar to those described by Mr. Hyde. I made a well outside of the tank wall, and then had great difficulty in getting a pump which would work satisfactorily. I wish to inquire what kind of pump is best adapted to accomplish the object where not only water is encountered, but also quicksand, brickbats, and every conceivable thing which could interrupt the action of a good pump. In the experiment to which I have alluded I spoiled three or four very good pumps which had been highly recommended to me. At last I consulted with an engineer of the Central Railroad, and asked him to look at the ground and tell me what to do. He looked at it and shook his head. He said, "You will never get a bottom in that tank; you can never get rid of the water. You might as well give it up and build your tank somewhere else." But I was bound not to be beaten in that way. The only pump which I found to operate successfully was of the screw pattern. I took a log about a foot in diameter; then took laths and nailed them one upon another, and piled them up perhaps 18 inches in height; then boarded over on top of the laths, sealing it all round; then I placed this pump at an angle of about 45 degrees—the angle necessary to raise the water as high as possible—and then I attached it to a portable steam engine and set it revolving. It dipped up the sand, brickbats, stone, and everything which came in its way, and carried them all off easily. I had no further difficulty after that pump was started. It would throw about a barrel of water at every half revolution, and it would make those revolutions about as rapidly as the machinery could be run. I had no difficulty then as to the water. Now as to the manner in which the bottom was put in to prevent its being raised by the water. Of course, after I got the bottom in, I reversed the pump and threw the water on the bottom of the tank. I modified the arrangement somewhat differently from that of Mr. Hyde in securing the bottom. I put the drain tile all through the entire bottom. All the drain tile pointed toward the well on the outside of the wall. I then laid sleepers over the drain tile, and planked them over. Then I put on the concrete bottom, and thus made a perfectly secure and water-tight tank.

Mr. E. J. King (Jacksonville, Ill.)—We have had a little experience of the same kind; and, so far as I am aware, the course which was adopted by us was a novel one. We had to contend with quicksand more especially than water. The contractor had almost given up in despair, and said that we would have to dig a tank in another place; but my father suggested a plan, which was adopted, and which proved to be a perfect success. In digging down, they had gone through some blue clay. He had men wheel the

clay right back, while others stood there puddling; and so they kept on. That is the bottom of our holder tank, which has now stood for ten years without any trouble.

Mr. H. Harthan (Selma, Ala.)—Some years ago a gas company selected a lot which was very low and swampy, upon which to build new works. I could take a 10-foot pole and shove it down with my hand 8 feet. You can judge by that what kind of soil it was. I endeavored to persuade them to change the location of the works, but they would not consent to it. In order to ascertain just what kind of soil we had to deal with, I dug a temporary hole, not to exceed two feet in depth, and found an abundance of water. I tried to bail it out, but did not succeed very well. I then lined off the size of my tank; dug a well down to the water; formed my curb of wood; commenced building with brick on the wooden curb, and then had the men dig in under the wood curb and settle the brick wall as low as they could, till they got down to about 3 feet in the water. I then procured a Coke & Maxwell pump, attached it, and pumped the water out, and continued sinking the well until it was far below where I wanted to go. Then I left the well, and commenced digging the tank. As fast as the men dug in the tank I kept pumping out the water, so as to keep the hole dry. At the bottom there was any quantity of broken stone. On the side next to the well I put in a 4 inch piece of gas pipe, which reached through the wall, and 3 or 4 feet inside of the tank. I filled the bottom of the tank with broken stone, (after I had built a platform to build the tank wall on) so that the water could run all through and flow out into the well. I kept up the pumping all the time until the holder was done, and then I reversed the operation. I did it all with one of Coke & Maxwell's pumps.

Mr. King—Mr. Hyde did not answer Mr. Somerville's question about the boxes. My experience has been very much like his.

Mr. Hyde—So far as I know, I do not think we have ever experienced any great difficulty in that respect. When the bells ring for fire our men always start out with a key and meter tongs. They get the meter out, if they can; if they cannot get the meter out, they go to the box and turn the gas cock. Of course the boxes are stopped up sometimes. For the last two years we have had a street box which cannot be stopped up with anything. It is what we call the "Buffalo Box." I think it is the best I have ever seen for street boxes. It requires a key to start the cover. Gas companies should see to it that the street boxes are kept clear. If this be done, there will be no difficulty in turning the gas off. I know that, with the boxes, where the cover is easily opened, the children are apt to fill them up with stones; but with the Buffalo box there need be no trouble.

Mr. T. G. Lansden, of St. Louis, Mo., read the following paper on

BENCHES.

Having been requested by a number of gas engineers to give to this Association my reasons for still adhering to settings of three retorts to a bench, I have concluded at this time to give some of the experience I have had, hoping that it may be the means of causing others to do likewise.

I have been, for eighteen years, practically engaged in erecting and operating gas works. From the experience gained in that time, I have come to the conclusion that the money made for a gas company, is made at the benches. I also have ascertained that the circumstances surrounding each company, are so varied, that it is not just nor fair, to expect the same results from different works. First—the great variety of coals, along with the great difference of cost of same; the vast difference in quantity and quality of coke; differences in what coke and other residuals can be sold for; cost of labor, lime, etc. Then, we add to these the difference in original construction of plant, benches, condensers, scrubbers, washers, etc. Truly, as "one star differeth from another," so do gas works.

When I speak of these differences I am alluding to coal works only—I would not dare take up the time of this Association, describing the many processes by which gas is made from substances other than coal. You all know they are as "the sands of the seashore." They are ever ready to show that their process is almost as cheap as daylight. I must say, though, I never have had the pleasure of meeting a man, who was (according to my idea) thouroughly up in the coal process, that abandoned his first love. Some have done it, owing to that *peculiar pressure*, which is sometimes brought to bear on an engineer, from the ends of his mains—that is, farthest from his works. I started out to say something about benches, or to give you some idea of the experience I have had. As I said before, the circumstances surrounding each works should govern their operations.

When I took charge of the St. Louis Gas Works, something over six years ago, I found the entire establishment arranged for benches of three retorts each. I felt, (as I know many of you have, who have visited my works) that they were away behind the times.

I had constructed quite a number of works throughout the country, and generally set benches of threes. This, I thought, was the best system for small works; and I was astonished when I found ninety benches of threes in the St. Louis works. This is one of the *circumstances* surrounding this works that differed from any other one of its size in the country.

As the works had been running a great many years, and the company had not become bankrupt, I concluded, before condemning them, to find out what they would do in a large works.

I knew what I could do with them in smaller works; but was not positive as to what I could do with them in large ones.

I operated the works for five years, and, at the end of that time, I could get no *evidence* that it was my duty to recommend my Directors to do away with them, entailing a cost of $20,000 to $25,000 in castings, etc., to make these works like other large ones throughout the country.

Mr. Pratt, who had been engineer for twenty-five years before his death, changed the entire works to threes.

Last year I had to rebuild one of the stacks containing 26 benches. In this stack I placed retorts of 3,000 inches of floor space, or 9,000 inches in each bench. These benches, containing 78 retorts, are turning out now over 800,000 cubic feet of gas every 24 hours. Last month the production was 819,000 cubic feet; average candle power, 17.82; yield, 5.25; temperature, 70°; amount of coke consumed under the benches, 42 per cent. of amount made.

With the old stacks I did not do so well; but will give you, from my report to the directors for three years back, the following figures:

In the year 1882 I made 420,000,000 cubic feet of gas; average number of retorts, 137; candle power, 16.92; yield, 5.12. In 1881, gas made, 394,750,000 cubic feet; retorts in use, 127; candle power, 16.99; yield, 5.13. In 1880, gas made, 349,344,000 cubic feet; retorts in use, 113; candle power, 16.79; yield, 5.20; average amount of coke used during the three years, 43½ per cent. of amount made.

I am aware that I have been severely criticised for still retaining the benches of threes. Some of the most eminent engineers in the country have condemned my action in this matter; yet, at the same time, have refused to give a year's report of the results obtained from the working of "sixes."

In presenting this paper, I have been actuated solely by this one idea, that some of those who have said I was so far behind the times, may make to this association the same report that I am now making; or, if not at this, then at out next meeting.

I have felt that a great part of the benefit we gain by our coming together is, to find out the experience of others; and if we are to advance in our profession it must be by comparing notes, and giving results, not of a month, but of a whole *year* at a time; and when our differences are great, when anything like the same conditions surround our works, we may then be enabled to find out if we are really doing the best we can for those whose interests are intrusted to our care. Had I been cramped for retort room in these works, I might have been tempted to go back to fives and sixes; but as my retort houses are ample for years to come, I have yet found no evidence that it was my duty to make the change. The stack of 26 benches which I built last fall is of sufficient size to admit a setting of fives, when the time comes that it is a question of more retort room.

In setting the benches I use but nine tiles, four saddles, and one lintel. I use for the furnace above the grate bars a brick, with bolter of 1 inch. As each course of brick drops back by this bevel 1 inch, it gives a width, at three courses high, of 18 inches. I then reverse the brick, and the two sides of the furnace come together at the top to within 8 inches. This gives the furnace something of a diamond shape, or of an ordinary furnace after it has been in use for six or eight months. I have run these benches, for a few days at a time, with 400 pounds of coal to each retort; but my regular charge is 333 pounds—or 1,000 pounds to the bench.

I find it about as easy, when a man is charging a retort, to put in 350 pounds as it is 200. I claim quite an advantage by having but three retorts open at a time, and but three retorts to crack and leak. From the large roof surface to the retorts I use, I have so much greater space for fixing the gas, which, I think, adds greatly to the yield per pound of coal.

I know a great many will claim that there is no such thing as getting the yield of 5.25 with like candle power and temperatures. When they do this, I wish to ask if their works are arranged and are surrounded with like conditions as mine.

I have now given a copy of my annual report for three years in the hope that I may induce others to do the same. I shall be happy to answer to the best of my ability any questions that may be asked on this subject.

Discussion.

Mr. J. Somerville (Indianapolis, Ind.)—I would like to ask Mr. Lansden how much coke he uses in his furnace.

Mr. Lansden—I use 42 per cent. This statement refers to the month of April. I ran eight other benches at the same time; but I refer to the work of this new bench for the month of April only; I do not speak of it as being a year's report. For the month of April I measured the coke in three different ways, and thus accurately ascertained the amount used; and it was, as stated, 42 per cent. I have not been able, for the last three years, to clear our yard of coke. Three years ago the yard was entirely empty. The other day I examined my books, took an account of every pound of coke that has

been sold, compared it with the estimate of the amount which we have on hand in the yard, and found that the average of coke used during three years was 43½ per cent. for the old settings.

Mr. H. Harthan (Selma, Ala.)—I would like to ask the size of the retort and the kind of coal used.

Mr. Lansden—I used a retort 18 by 28½ inches, and 9 feet long. I think I have as good coal as I ever saw. It is mined specially for us. It is Pittsburgh coal, from the Keystone mine. The coal which is shipped to us is delivered at the works by wagons from the barges. The wagons dump the coal in front of the retort house. I have thus an opportunity to test the coal from every barge as it arrives. The agents of the coal company requested me, in case I ever found any difference in the coal, to give the number of the barge from which it came. During the first year we received from them I gave them the numbers of seven barges. They know just where every barge of coal comes from. Since that time I have not had occasion to condemn a single barge of coal; in fact, I find no diffcrence in it. I think that is one of the favorable circumstances connected with our works.

Mr. J. Fullager (Cincinnati)—Do you use any mixture?

Mr. Lansden—We used 9½ per cent. of Washington (Indiana) cannel coal last month.

Mr. Fullager—I have tested the Keystone coal pretty well, but could not get anything out of it. I have used it under both low and high heats, and could get only 9½ to 10 candle power.

Mr. Lansden—Is the coal mined for you?

Mr. Fullager—We get the pick of the market; and we go and examine each barge. We know what the mines are, and we think there is very little difference in the coal from different parts of the mine. I have taken coal from all the different coal dealers, and have run it in my test works, and have run it till the meter stopped and till the coal was almost powder; but I have never yet reached 5.25 by the use of Pittsburgh coal alone. I have done it by mixtures.

Mr. Lansden—In October last our city made a demonstration in the way of an extra amount of light; and I attempted to run about 20-candle gas. I found that when I ran above 17 my yield did not keep up. When I first made the test I used Washington coal and Peytona coal, week and week about. Then I kept the candle power at the same thing. I then ran the coal one month about. I did that for one whole year, so as to go over the winter season. The next year I adopted the use of the Washington cannel, *and* have been using it for over three years.

Mr. Fullager—The cannel coal is a very rich coal; it does not give as high a yield as Peytona, but it gives very good candle power.

Mr. Lansden—A great many men have said to me that there is no such thing as making a yield of 5.25. I do not think that any one who has been at my works, and has examined my books, can doubt the result I have stated. But I want it understood that this yield is largely due to the peculiar circumstances which surround my works. I want to be up in the business, abreast of any of you; I invite careful examination of the circumstances under which I am working; but, taking into consideration the circumstances which surround me, and what I have accomplished, I do not think it is fair to criticize me by saying that I did not do this. I do not intend to be personal, but this thing has happened several times in the last two or three years. If I can make more money for my company with benches of sixes, I want to put them in; but I have not been able, as yet, to find any record from any gas company running for a whole year which would justify me in throwing away my present settings. I have a narrow retort room; there is only a space of 15 feet on each side of my benches; and there are many other little things which go to make the works different from others.

Mr Fullager—Do you not think you could decrease your percentage of coke by putting in other retorts? I think that 42 per cent. is rather an excessive use of coke at the present time. As to candle power. We have had a great deal of talk about a yield of 5.25 and 5.15. I think that at the meeting of the New England Association, where they claimed these great yields, there were other things around the works which gave them such yields. We know that coal will produce only a certain amount of gas; that it is impossible to get more than a certain amount out of it. The Kanawha coal is advertised as giving 14,000 feet per ton; but they draw the candle power down to 14 candles. I have tested all the coals. I have taken everything out of the coal, until it stopped producing; but I have never yet been able to get such high yields. It is impossible to get anything more out of coal than there is in it. These high yields that we hear so much about are obtained by mixtures. I do not care if the agents go through the mine and pick all the fat coal out, they cannot get any such yield from it. There is no doubt that by increasing the number of retorts in the benches you decrease the use of the coke. I found that when using fives I was using 45 per cent. of coke; that when using sixes I was using 40 per cent. of coke; that when using sevens I was using 33 per cent. of coke; and that when I used eights I got down as low as 22 per cent. of coke. This shows that the more coal you can burn per bench the lower will be the percentage of coke used.

Mr. Lansden—I think I have given my data in such a way that you can determine from that, and from your own experience, the correctness of any statements of what I have done. You all know the data of gas making—the yield, the candle power, the coal used, and the temperature at which the gas is measured. If there are any other circumstances by which results can be measured in the gas business, I want to find them out. I am making gas with benches of three retorts. Unless a man will put himself in my position and take just what I have got, or come there and see the thing done, I do not think he is in a position to say that I am not doing a certain thing. I ask for a year's report from the man who thinks that I have been mistaken, or have made a blunder. When I do a thing I know it; I know what results I obtained; and nobody can gainsay my results unless they do the same thing in the same way and with the same material. Unless that is done, no one is in a position to say that I have not done what I claim to have done. Now as to the amount of coke used. I claim that I can use 60 per cent. of coke. I do use 42 per cent. I have found some works with three benches of sixes that have been doing well. I have had experience with both kinds. I have torn out sixes and put in threes; and I have torn out threes and put in sixes. The statements I have made are based upon information gained by practical experience. I ask the gentlemen who criticized me to do what I have done, and give to this Asscciation what I have given. I have given to my Directors an exact report for three years, with the works as I found them there. We are setting new retorts every year, but we are using the old stacks. What I state is not a theory; it is just what my books show to be the result of actual work.

Mr J. R. Smedberg, (Lancaster, Pa.)—I would like to reply to one or two of Mr. Lansden's remarks. I do not wish to make any unfair criticism, but I think there is one thing which he has entirely overlooked or omitted. I do not at all doubt that Mr. Lansden is doing just what he claims. I understand that he is getting, in round numbers, about 10,000 feet per retort der day.

Mr. Lansden—Yes; I am running now 1,000 pounds to the bench of threes, and get considerably over 5,000 feet per bench

Mr. Smedberg—You have about the same retort floor as we get in a bench of fives or sixes, but your fuel account is as high as the oldest settings of fives that I know of; and it is a great deal below the results that I got in San Francisco, for eight years, from benches of sixes. Therefore, so far as regards the space taken up, your results are behind this old work of mine. As to the fuel account, your are also behind what a dozen others are doing. Next we come to the question of candle power and volume. Have you had your station meter rated so that you know that it is absolutely correct?

Mr. Lansden—One of our station meters, made by the American Meter Company, has been in use only two years. I have never put the prover on that.

Two years ago the drum of the old meter gave out. That was thoroughly tested. There was found to be a little trouble about the dial. The man set the water line and then left his apparatus with me, so that when the dial came I should have the privilege of going through the same experiments and making the tests to satisfy myself. I tested the meter as thoroughly as I could and found that there was hardly a hair's difference between the two tests. I made a test for twenty-four hours, running the meter both fast and slow. I think my two station meters are correct. I have a man who goes to my station meter every morning at seven o'clock, and after running the water out for three-quarters of an hour, and then running it in, he stands at the pressure gauge to see that it is kept at the same height. He makes sure that he sets the water line right every morning. He is held responsible for that. I pass through the room and examine it every day; and I think I have got my station meter as nearly correct as it is possible to have it. Now as to the fuel account. I say that it takes four things to determine this question—first, how much coke do you use? second, what candle power do you make? third, what yield do you get? fourth, at what temperature is your gas measured? I say that I can use 60 per cent. of my coke. The figures show it. I have an average yield of 5.15 for three years. There are many works, larger works than mine, from which I have not been able to get any reports. I do not know what they may have done; but I say that I must be credited with the yield which I get, and have stated. I am entitled to use more coke but I want the whole thing to go together. I do not want to be asked how much fuel I use, unless I have credit for what I get by the use of an excess of fuel.

Mr. Smedberg—But you ought not to have credit at both ends of the account.

Mr. Lansden—Very true; but when I measure the amount of money that the Directors get from the works, it balances the account. If I used more coke and made a difference in my yield, I should have credit for it. I do not say that I use less coke to a bench of threes than I would to a bench of sixes. I wish all the members of the Association would run sixes as I have done, and then come here next year and report these four items: the amount of coke used; the candle power; the yield; and the temperature at which

the gas is measured. Be sure that you get the temperature. I have a blank laid on my desk every morning containing a statement of the temperature at the outlets at different places around the works, taken at eight o'clock in the morning, and at four o'clock in the evening. The average temperature is about 70°. I have a thermometer placed at the back end of the condenser. The man pulls it out and looks at it. If it is one degree up, he puts more water in. We cannot, of course, keep it at 70° exactly, for I have sometimes to drop off some of the benches and cannot at all times heat exactly alike; but we try to run it at about 70°.

Mr. Smedberg—What is your consumption of coke?

Mr. Lansden—I never saw such a difference as there appears to be among the Eastern societies in that regard. No two of them measure alike. I do not get any such yield of coke as many of them claim. They talk about a ton; but when I commence figuring on it, I find that they are talking about a gross ton. Then I find that I am all wrong, because in my calculations I have been figuring on a ton of 2,000 pounds. That is my ton. A bushel measure with me is 2,688 cubic inches. The yield of coke is from 35 to 36 bushels to a short ton of coal. That is about what it is with us. A certain amount of the coke is used for firing. To test the amount of coke used I had a box constructed which holds exactly 10 bushels. I had three men to run these benches. I used a little more man power perhaps than they do for sixes. I used one man to one bench. That is my average. This 10-bushel box is filled. I had them fill the box and put it in the charge for 24 hours. Every pound of coal put into the retort was to be put into this box, and dumped out. It took me about eight days to go through the work. Then I passed it to the next gang of men, and they ran it for twenty-four hours. That was one test that I made. Another test was this: I me sured the wheelbarrows that the coke was wheeled out in. I required the men to be very careful about filling the barrows, and had them keep a record of the number of barrows they wheeled out. I ran that test for 48 hours. I commenced Saturday morning, and ran Saturday and Sunday, and made them wheel the coke all into one pile outside the house. Then on Monday morning I commenced with the same boxes and measured the coke. I took three different methods of ascertaining the quantity of coke I was using in those benches. I did not make any such yield of coke as has been claimed by others. I am speaking now of Pittsburgh coal. From the cannel coal we did not get so much.

Mr. G. A. Hyde, (Cleveland, O.)—I would like to ask Mr. Lansden, or any other gentleman, if they have ever made any experiments with a view of determining whether a 12-inch furnace was any better than a 14-inch, having reference to the economy in fuel. I have tried it; and I think the gentleman's large amount of coke is due to having a big furnace, an unnecessarily wide furnace.

Mr. Lansden—It is unnecessarily long also. It is 4 feet 6 inches long.

Mr. Hyde—My furnace was 4 feet 6 inches long and 12 wide. I built a few furnaces 14 inches wide, to try them. I found that the difference in coal between a 14-inch and a 12-inch was the difference between 2,047 and 1,843 pounds. There is therefore, a total of 200 pounds required to accomplish the same work when you have a 12-inch furnace instead of a 14-inch. I think it is a very important matter to have the furnace narrow. You can accomplish the same work equally well with less fuel.

Mr. Somerville—I weigh all the coke that goes into my furnace. It does not cost me anything to weigh it; the man who takes up the fuel passes it by or over the scale; so that I get the exact weight of the coke used, and I have the figures here. I get my yield by adding what we have used to what we have sold. Last year I got 33.2 bushels to the ton of 2,000 pounds. I think it ought to be a little more than that. We sell our coke by contract, and the fellows will heap up the bushels, and sometimes take more than they are entitled to; and of course that reduces the yield. This is not an experiment with me. The coke is taken from the works; we get the money from it, and this is the result. The percentage of fuel used is 38.2. I think it ought to be less than that. These figures may not be of much value, but I give they to you for what they are worth.

Fuel Record at the Indianapolis (Ind.) Gas Works.

FUEL RECORD FOR 1882.

Month.	Percentage Coke Used of that Made.	Pounds Coke Used to Carbonize 100 lbs. Coal.
January	30.1	31.4
February	31.9	30.1
March	28.0	28.0
April	26.8	26.5
May	23.6	27.7
June	25.9	26.5
July	27.7	26.0
August	27.9	36.6
September	32.9	28.2
October	28.9	28.4
November	28.3	27.7
December	32.9	30.4
Average	28.7	28.3

RECORD FOR SIX WINTER MONTHS, 1881-2.

	Percentage Coke Used of that Made.	Pounds Coke to Carbonize 100 lbs. Coal.
Oct	29.1	30.3
Nov	31.7	30.3
Dec	32.2	30.8
Jan	30.1	31.4
Feb	31.9	30.1
Mar	28.0	28.0
Average	30.5	30.1

RECORD FOR SIX SUMMER MONTHS, 1882.

	Percentage Coke Used of that Made.	Pounds Coke to Carbonize 100 lbs. Coal.
April	26.8	28.5
May	23.6	27.7
June	25.9	26.5
July	27.7	26.0
Aug	27.9	26.6
Sept	32.9	28.2
Average	27.5	27.2

NOTE.—The percentage of coke used of that made should be increased one-third, as one-third of the coal was carbonized by tar, making the true percentage 38.2. Yield per ton of coal carbonized, 33.2 bushels. This yield is per ton of 2,000 pounds.

There is a rather remarkable thing to which I wish to call your attention. In the winter months my consumption of coke is increased. As will be seen from the above tables, the coke used during the six winter months shows an average of 30 pounds burned to carbonize 100 pounds of coal; during the six summer months it is 27.2. I cannot think of anything likely to cause this increased consumption of coke unless it is the radiation from the benches. I ought to do better in the winter time, because I usually employ heavier charges then. I thought perhaps this statement would be interesting as being the daily ran of the works—not intended as an experiment in any way, but merely as a statement of what we are doing and what we are getting the money for.

Mr. Lansden—Right here comes in another question, which I see is agitated in the Eastern societies. Do I understand you, Mr. Somerville, to say that you have given the percentage of coke used to work off 100 pounds of coal. I think there is where we are all wrong. I have reported on the percentage of coke made. I use 43½ per cent. of the coke made. If you will figure that according to the yield you will find that I am not very much away from your result of 28 pounds of coke to the 100 pounds of coal worked off. My percentage is based altogether on the percentage of coke made in the gas works, and used under my furnace.

Mr. Somerville—My statement is 38.2; and 42 per cent. of the coke sold.

Mr. King—I have always been taught that it was fair and honest to measure the coke, and not to weigh it. The weight might vary according to the atmosphere, and according to the amount of water it has absorbed in the process of quenching. I think that in all reports of tests there ought to be a statement of the condition of the coke when weighed. Coke may vary largely in weight under different conditions.

Mr. Lansden—There is another point which should be understood before we leave this matter. About 35 pounds is what we call a bushel by weight; but I can weigh the coke one day as it comes from the benches, and then weigh it after it has been in the yard for a week, and the result will be very different. Our wagons will vary, as between wet and dry measure, from 10 to 12 bushels. After the coke has been in the yard for six or eight months it is more valuable than when first taken from the oven. What do you figure the weight of a bushel of coke to be?

Mr. Somerville—We figure it at 40 pounds.

Mr. Lansden—That makes a difference in the results given. I figure it at 35 pounds, but I go by my measure of 2,688 cubic inches to the bushel.

Mr. Somerville—We sell 40 pounds to the bushel.

Mr. Lansden—We sell 35 pounds, and sell by weight.

Mr. Hyde—I am almost afraid to make any statement with regard to the coke business. I made a statement at Pittsburgh, but nobody believed it. I made a mistaken statement there (which I afterward corrected), that we had used 27.2 per cent. of the coke made under 8-feet retorts, for six months. I have yet to find a gas man who believes any such thing. I have not yet found anybody to accept that statement as correct; but that is the statement which I made. As Mr. Lansden says, there are many and varying conditions which need to be taken into consideration. I get at my results in this way: I have frequently made experiments to find out how many bushels of coke could be got from a ton of coal. I make it that we get 33⅓ bushels of coke from a ton of coal, and that it weighs 37½ pounds to the bushel usually. Of course there is some dust and waste. When I make an estimate I do not weigh or measure the coke; I find out how much coal it takes to make a bushel of coke. As near as I can make it out it takes 60 pounds of coal to make a bushel of coke. I base my estimate on that, and neither weigh nor measure the coke afterward. That is the result of several trials which I have made. I only speak of this now because there seems to be so much diversity of opinion between the gentlemen. I have happened to strike midway between you, gentlemen, and fix 37½ pounds as being the weight of a bushel of coke. In weighing the coke I always shake the bushel a little. I have a two-bushel box, which I fill up and then shake it. That might make a difference of 2½ pounds between his estimate and mine. I figure 33⅓ bushels to the ton of coal, and it weighs 37½ pounds to the bushel. We charge our benches with a certain amount of coal—say 200 or 225 pounds to charge; and every day, as they draw the coke for fuel, they mark

down so many pounds of coke used for this purpose, and there is an account kept of it; and I figure it on that basis as taking 60 pounds of coal to make a bushel of coke. In working in that way we use, during six months, 27.2 and 27.8 per cent. I have not found any other gas man to believe that I do it. I do not mean to convey the idea that you, gentlemen, will not believe what I said; but that you accept my statement with a mental reservation; that you don't quite understand how it is done

The President—Will coke from different qualities of coal vary in weight?

Mr. Hyde—The coke will vary in weight. At the meeting at Pittsburgh there was a sort of "I dont't understand how it is" expression in regard to this coke business. When Mr. Price was at the last Boston meeting, some one asked him how it was about the coke; and he replied that he did not know anything about it; that Mr. Hyde was going to fix that matter all up. Next year I am going through these tests again in a particularly careful way. I think I was all right before, but I intend now to be sure of it; and will be able to prove to you at the next meeting that I am right, or I will admit that I am wrong. Mr. Lansden spoke about using 60 per cent. of the coke. Some time ago I made up a percentage of the coke that we had used, and I found it to be about 27½ per cent. We are now running on coke, and I am going to see if we can run long enough on that to find out what we are doing. I will measure the coke carefully by the use of a new measure constructed according to the Association's rules. Then I will see the coal weighed, see it put into the retort, see it drawn out, measure and weigh it myself, and see how much coke and how much dust there is, and be able to know all about it. I will then be in a position to speak with greater certainty than I have yet done. I have on my books now the results as I have stated them. But I will be more specific and careful in the future.

Mr. Lansden—Is it not well to keep this idea in view; to make a strenuous effort to get a better yield out of our coal, even if we do burn a little more coke?

Mr. Hyde—I am not so particular about getting a large yield; I believe there is a point where you want to stop. I glanced at my carbonizing book before I came away, to see what our yield was for the last six months, and found that it was a little over five feet. I would rather not have it any greater. You can get more, but that is about all the gas I want to get from it. In running coal through experimental works we sometimes get 5.65, and then again we will not get more than 4.85. I think that too high heats injure the benches; and you do not get a good illuminating gas; you get *something* that is doing an injury to the gas which is sent out; and you must put in some oil or cannel coal to make up for the deficiency in the gas. I am not in favor of producing over 5 feet.

Mr. H. Pratt (Chicago, Ill.)—Do those who use 40 per cent. of the coke include what is used under the boiler, or do they sell 60 per cent.?

Mr. Lansden—I use coke all over the works at different seasons of the year, and at different points. The percentages which I figure on in my measurements are of coke used under the benches in the furnaces for carbonizing coal. In my works I have nothing to do with the coke after it is laid in the yard.

Mr. Hyde—When I speak of the amount of coke used I mean the coke used under the benches. I figure it out in this way: I put 1,000 pounds of coal in a bench; I divide that by 60, and it gives so many bushels of coke; and we use about 30 per cent. of that.

Mr. Pratt—I usually make my observations on the coke which I sell.

Mr. J. H. Woodmansee (Danville, Ill.)—Is this yield of 5 feet, which Mr. Hyde claims, from pure coal without any enricher?

Mr. Hyde—Yes.

[To be continued.]

A Visit to the Richmond (Ind.) Gas Works.

By Rangeley.

Among the many gas companies which have been compelled by the cry for "more light" to answer the imperative call, may be mentioned that at Richmond, Indiana. During a visit of inspection just made, an opportunity was afforded to thoroughly examine these, in many respects, really model works. Mr. Starr, who, by-the-way, is sole proprietor, met me at the depot and we drove first to his office, centrally located on the main street. Gas stoves were ranged on the sidewalk, lined the wall, and a car-load was piled up in the rear of the office. Loaves of bread, and dozens of biscuit, freshly-baked, were exhibited in the show-window. The evidence was all around me of the enterprise which has enabled Mr. Starr to claim a larger *pro rata* day consumption than most other gas companies in this country or Europe.

I was greeted here by Mr. Edward Starr, the president's son, who is becoming proficient in the knowledge of gas making and distribution, and who already exhibits evidence of superior ability.

Arriving at the works, we first inspected the station meter, a handsome apparatus constructed by the well-known firm of D. McDonald & Co., of Albany, N. Y. In the adjoining room were two condensers, built by T. F. Rowland, of Brooklyn, N. Y., and a "Standard" washer-scrubber erected by the Smith & Sayre Manufacturing Company. Taking a piece of yellow turmeric paper, Mr. Starr turned a little cock, at the outlet of the washer, and the gas was shown to be entirely free from ammonia. He said that both these appliances were quite perfect in their results.

The purifying house at these works is one of the most complete that I have seen, having large capacity, being well arranged, and the character of the workmanship assured by the name of the builder—Mr. Rowland. Mr. Starr uses a Root Rotary and a Smith and Sayre steam-jet exhauster; he also has in operation Isbell's ingenious governors. He uses both lime and iron sponge in his purifiers—the bottom layer being lime. He manufactures all his trays on the Cabot principle, with the improvement of a third malleable iron frame in the center of the grid. He uses oak instead of pine. Their great strength was amply demonstrated by standing and jumping on one supported at either end. Our united weight (430 pounds) made no seeming impression on the surface. The screens before being put into action, are well protected by a coating of mineral paint.

Five benches of "sixes"—three of them arranged on the Stedman-Stanley system—enable Mr. Starr to send out a large quantity of gas, his make ranging from 4.75 to 5.20 feet to the pound. The holder capacity and coal storage departments are on a liberal scale. I was especially interested, however, in Mr. Starr's ingenious and practical appliances for utilizing, to the best advantage, coke. He was one of the first, if not the originator, of the plan to place coke in successful competition with anthracite coal, by breaking and screening it. An endless chain bucket belt carries the coke from the retort house floor level to a height of 30 feet, where it passes through the breaker and three screens, which divide it into dust, breeze, and coke of the size of nut coal. The latter finds a ready sale, at a high price, for use in base-burners, ranges, bakeries, etc. The breeze and dust is also marketed.

Another of the many surprises experienced was when, ushered into a room having a half-dozen shelves holding glass jars containing the chemicals for generating electricity, I asked, "What are these for?" Touching a key, he replied, "I have just turned on the gas in nearly every street lamp." Adjoining the battery-room was a suite of apartments the like of which cannot be found in any other gas works in the world; but yet which could, with but little expense, be introduced elsewhere, adding not only to the comfort, but the health also, of the hard working gas manager and his assistants—a bath-tub, steam-bath, Turkish-bath, shower-bath, lounges, easy chairs, toilet dressing rooms, etc. But Mr. Starr is likewise a humanitarian. He provides for his workmen convenient rooms with bath-tub, wash-basin, clothes-room, closets, where each man can keep, under his own lock and key, soap, sponge, and towels. Capacious stables, sheds, shops, and outbuildings (all in perfect order) increase the efficiency of this well-appointed works. A nice lawn and vigorous young trees add an attractiveness that every other gas company would do well to copy.

The works are located within a-half mile of the center of the city, on a high bluff overlooking the Whitewater River. Eighteen-candle gas of a clear, bright, handsome character is naturally the resultant of such appliances as I have described; and the consumers are well satisfied. *I did not see an electric light.* Richmond is a city of homes, most of them owned by their occupants. The streets are lined with beautiful shade trees, a city ordinance wisely making it obligatory to set out and maintain them. A large part of the city is built upon the farm of 260 acres formerly owned by Mr. Starr's father. I had the pleasure of meeting his mother; a remarkably bright, intelligent and well-preserved lady of eighty-five.

A delightful afternoon was most fittingly terminated by an agreeable evening spent at the hospitable home of my host, on the high ground enclosing the city. Mrs. Starr's wide information and extensive knowledge, added to the gentle courtesy and charming manner so characteristic of the "Friends," serving to intensify the pleasures of my visit.

How to Place Gas Pipes Under Floors.

The *Building Times* says that it is common enough, in cases where a pipe has to be led under flooring and across joists to serve a pendant, for the pipe to be taken straight across the room, and the joists notched about an inch deep all the way. Workmen who do this never reflect on the harm they are doing to the floor, nor do they know that a notch cut out of the top of a joist will seriously weaken it. This at once becomes evident when it is known that the strength of a joist, which is a rectangular beam, is proportional to the depth squared. If, therefore, a groove 1 inch deep is cut across a 7 inch deal, the reduction in strength is not only one-seventh, but a great deal more, in the proportion of 36 to 49, or a loss of rather more than one-quarter of the original strength of the beam. This somewhat startling result is due to the self-evident fact that the upper part of the joist is required to be solid, in order to resist compression, just as much as the lower portion must be capable of bearing tension; and to cut a notch in the top of it is equiva-

lent to removing the substance along the whole length of the joist to the full depth of the groove. This observation only applies to cases where the notch is cut out of the center of the span, which is the commoner practice. There is much less objection to cutting joists close to the end, and thus allowing the pipe to be laid round the room to a point where it can be run to the center between two joists. Or, if this course cannot be followed, the pipe may be safely passed through a hole bored in the middle of the joists. If this is not feasible, the indispensable notch may be cut right down to the middle of the joist, and the pipe thus laid across the neutral line; the space above being afterward filled with a tight wedge which will safely transmit the stress.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

The New Oregon Iron Works Fired Up.—The new foundry and shops of the Oregon Iron Works, on 20th street, between 10th and 11th avenues, were put into action on the afternoon of May 14. The "first cast" was duly celebrated, and Mr. Floyd announces that he is now ready to do any and all sorts of work that may be required.

Cheaper Gas for Scranton, Pa.—On December 30, 1882, President Scranton, of the Scranton Gas and Water Company, notified Mayor Powderly that although the contract existing between the city and the company for lighting the city lamps did not expire until November, 1883, the gas company, being desirous of doing all that it could towards making the town attractive and pleasant as a place of residence, had determined upon making a reduction of $4 per annum in the price of each street lamp supplied. The price agreed upon in the contract was $22 per lamp, and still had ten months to run; "it is needless to say that Mayor Powderly agreed to the proposition, and now Scranton only pays $18 per lamp. The same soulless corporation," on May 19, notified its consumers that on and after the first day of this month the price of gas would be reduced to $2.00 per thousand, subject to a further discount of 10 per cent., provided the bills be paid on or before the 20th day of the month in which they are presented. Good for Scranton.

Price of Gas Reduced in Toronto, Ontario.—Mr. W. H. Pearson, Secretary of the Consumers Gas Company of Toronto, Ontario, announces that his company has decided to deduct 37½ per cent. discount from the gross price of $2 per thousand cubic feet from all accounts for gas supplied by seperate meters for cooking stoves and engines, when paid within the stipulated time, thus reducing the net price from $1.50 to $1.25 per thousand feet. This reduction will be made to apply to all gas comsumed, for the purposes mentioned, from date of April, 1883. He also announces that his company is prepared to sell and lease cooking stoves and heaters at very low rates, and that all who desire to so do may at any time, by paying a visit to the office of the company, examine a complete collection of gas engines, heating stoves, etc. His company make no charge for the extra meter. However much we may differ in belief with Mr. Pearson on some of the cardinal points of gas making, we certainly are in entire accord with him in what constitutes intelligent methods of increasing the "send-out."

The Ross Stoker to be Put into the New Boston Works.—The Boston (Mass.) Gas Light Company will introduce the Ross Steam Stoker in the new Commercial Point Works. The success which has attended, and is attending, the use of the steam stoker must be very gratifying to Mr. Ross and to the fraternity generally.

Notes from Dayton, Ohio.—Superintendent Joseph Light, of the Dayton (Ohio) Gas Light Company, has in use at his works an extremely simple and efficient method of handling the covers of his purifiers, through the agency of a hydraulic lift. Mr. Light has promised to prepare a paper, illustrated with drawings, on his method; it will be read at the October meeting of the American Gas Light Association. The enormous increase in gas consumption in Dayton is illustrated by the fact that when Mr. Light put in his Mackenzie exhauster seventeen years ago, its capacity was rated at three times his largest make. Last winter he passed through the same exhauster four times the quantity of gas for which it was originally constructed. He ran it at 160 revolutions per minute. One of a capacity commensurate with the present production is to be put in this summer.

The Laclede Manufacturing Company to Furnish the Brick.—The Laclede Fire Brick Manufacturing Company, of St. Louis, Mo., have been awarded the contract to furnish 600,000 fire-brick for the new East End station of the Cincinnati Gas Light Company.

Mr. Joseph Krumholz, of the Buffalo Gas Light Company, "Surprised."—On the evening of Tuesday, May 15, Mr. Joseph Krumholz, Secretary and Manager of the Buffalo (N. Y.) Gas Light Company, was astonished to hear sounds of vocal music in front of his residence, No. 510 Ellicott street. A little investigation led him to conclude that he had been "taken by storm," as it were. The vocalists proved to be members of the Veterans' Singing Society, accompanied by about 80 employees of the company, whose object was to congratulate the genial manager on the thirty-first anniversary of his connection with the works.

Mr. Krumholz, upon recovering to some extent his wonted equanimity, invited the party into his domicile. Superintendent Louis Boore, who appeared to be the chief ringleader in the assault, advanced toward the culprit, and presented him with an elegant walnut secretary. In making the presentation, Mr. Boore spoke as follows:

"Mr. Krumholz: Your associates and friends of the Buffalo Gas Light Company, have invaded your happy home to-night without even saying by your leave; the fact is we came to surprise you and, judging from your actions, we have succeeded admirably.

"The object of our call is to commemorate an event which took place 31 years ago to-day. On that day you will recollect you entered the service of the Buffalo Gas Light Company and have been in its employ ever since.

"We congratulate you upon your long and honorable connection with the company. During all these years you have made the business of the company your special study. We congratulate you that your watchful care of the interests of the company, your untiring efforts in its behalf, your scrupulous honesty in dealing with the company and acting as its representative, your courteous treatment of all with whom you are brought in contact, employees of the company and its patrons alike, have been appreciated by our board of directors.

"To win the approval and commendation of men like Hon. E. G. Spaulding, Messrs. Pascal P. Pratt, G. T. Williams, E. H. Howard, George Howard, B. C. Rumsey, W. Bucknell, is a distinction of which any man may feel proud.

"Mr. Krumholz, we intend no flattery by what I have been delegated to say to you, but simply to give expression to the plain truth and our honest convictions.

"We congratulate you upon your honorable record and wish you many more years of service in the responsible position you now occupy."

Mr. Krumholz, though manifestly taken entirely by surprise, managed to make a fitting reply to the remarks of the superintendent, expressive of his appreciation of the compliment, and speaking of his long connection with the gas works. In the meantime Mrs. Krumholz had been very busy, arranging a bountiful lunch, of which all present were invited to partake. The affair was admirably managed, and to Mr. K., at least it was a genuine "surprise party." The good feeling which prevails between him and the company's employees is very gratifying.

New Gas Works at Lima, Ohio.—Lima, Ohio, is building a new gas works, and it is proposed to make it a model one, as the people in charge of the construction have given orders that no expense shall be spared in the endeavor to gain that end. Kerr, Murray & Co., of Fort Wayne, Ind., are to furnish the iron work, and Taylor & Anderson, of Cincinnati, Ohio, are to erect the benches.

Price of Gas in Nebraska City.—In the last number of the Journal we stated that the Nebraska City (Neb.) gas works had been sold under foreclosure proceedings instituted by the mortgage bondholders, and that the property had afterwards been re-conveyed to Messrs. McMillen and Wilson, who immediately set at work fixing up the plant, which was in a rather dilapidated condition. The old management formerly charged $4.50 a thousand to all classes of consumers, and the wonder is that they managed to keep on their feet as long as they did. The new scale of prices, instituted by Messrs. McMillen and Wilson, is as follows:

To consumers burning less than	1,000	ft. per month.	$3.50	per M
" "	1,000 to 3,000	" "	3.30	"
" "	3,000 to 4,000	" "	3.10	"
" "	4,000 to 5,000	" "	2.90	"
" "	5,000 and upwards	"	2.50	"

The Sioux City (Iowa) works, which are under the management of the same wideawake gentlemen, reduced the price of gas, on May 1, to $3.00 and $2.40 from the former prices of $3.50 and $2.90; the scale existing at both the places mentioned is modeled on the same plan. The cost per annum for each street lamp-post in Sioux City (before the works changed hands two years ago) was $50, and the lights were extinguished at 11 o'clock. The price now charged is $30.00 per annum for each post, and the lights burn all night. This record speaks for itself.

Brother Frost will See that the Confidence in Gas is not Misplaced.—Superintendent Frost, of Exeter (N. H.) Gas Company, writes us that Phillips' Exeter Academy (a widely-celebrated old seat of learning) is to commenorate its centennial with a programme which embraces, among its features, a ball, banquet, etc. The projectors of the affair (to use Bro. Frost's own term) were afraid that the "belt might slip," and so the electric

arc was dismissed, as a doubtful servant at best; and it was decided that "old reliable" coal gas was the only illuminating vehicle at command. The festivities are to be conducted under mammoth tents; and it is perfectly safe to assume that Brother Frost's end of the programme will be carried out to the letter.

THE DETROIT OPPOSITION SCHEME.—Mr. Alexander Lewis, President of the Detroit Gas Light Company, has published a pamphlet which pretty thoroughly exposes the hollowness of the methods of the schemers who desire to build an opposition gas works in Detroit, Michigan. A certain Mr. Jackson is the gentleman to whom was entrusted the delicate mission of "getting ordinances passed," and if we mistake not, Mr. Jackson has had similar missions in several other places throughout the country; in fact, he may be classed as an advance agent. These people are also sometimes known as "road-agents." Mr. Lewis, in his pamphlet, makes out a very complete case against the Improvement Company, and the figures given in relation to kindred operations, in former times, particularly those which refer to Rochester, N. Y., and San Francisco, Cal., are full of richness. We here reprint the closing portions of the pamphlet:

"The 'Improvement Company' seeks to secure an entrance into the city by profuse and specious promises. Of course it agrees to sell gas somewhat below existing prices in some respects. This it must do to secure a hearing. But its offer to light and care for lamps at $25 each per year is one which the existing companies would be glad to make. Its promise not to sell or assign 'franchises' is simply illusory. No corporation can sell its franchises, or consolidate with another, except by leave of the legislature, and no such power has ever been granted here to gas companies. Its proposition to lay pipe throughout the city whenever 'the interest, comfort, and convenience of the inhabitants' require, is made ignorantly or recklessly. It would be required whenever there was one householder able to pay for gas. It is equivalent to an agreement to pipe the entire territory of the city. Such an obligation would bankrupt any company. And it may be assumed that such a promise is not made to be kept.

"The above are the principal promises made by Mr. Jackson in his petition to the Council. But in his printed pamphlet he assumes to give some figures amount of money paid for gas consumed yearly in Detroit. He says 'the people of Detroit pay for gas, public and private, the sum of $800,000 per year, which is in round numbers $300,000 in excess of what they would pay if all the gas used were furnished by our company and made by our process.'

"We have before spoken of the utter unreliableness of the statements and assertions made by water gas men. This last one is in keeping with the rest. Eight hundred thousand dollars paid yearly in Detroit for gas, of which $300,000 will be saved by patent gas!

"What will be the thought, when the fact is stated that there is not the slightest foundation for the above statement! The entire amount paid in this city during the last year for gas, both public and private, falls considerably below $460,000. Mr. Jackson's astonishing saving of $300,000 is pure humbug.

"It is boasted that the men in the 'Improvement Company' are very rich. This may be; but we have seen what their real business is. They are not here on a charitable mission to sell cheap gas. They are here to build works at extravagant prices, and to carry the booty away in fraudulent stocks and bonds.

"It is even said that the Standard Oil Company is in the 'Improvement' scheme. It may be so; but if there is a merciless and unscrupulous monopoly in the country it is this Standard Oil Company. It already levies its tribute in every household where a lamp is burned. Is not that enough?

"In conclusion, the Detroit Gas Light Company desires to say that its policy is to sell gas at prices which will secure only a fair profit. Circumstances beyond its control have hitherto greatly crippled it in this respect. The recent growth of the city has improved its opportunities, and before this new competition had appeared, the Board of Directors had under consideration the question of a reduction of rates.

"This company does not profess that it can give away gas, or that it is willing to sell it at rates that will not bring it a reasonable profit.

"But a large part of its stock is held here; it is managed by directors living here; it is managed with careful economy. It knows it can furnish gas of standard quality as cheap as any honest company can, and it intends to do so. It is one of the largest taxpayers of the city, and it believes that its property will not be wantonly sacrificed that foreign speculators may be enriched."

THE EQUITABLE GAS LIGHT COMPANY, OF NEW YORK CITY.—At the meeting of the Equitable Gas Light Company, held May 15, the following officers were elected: R. M. C. Graham,. president; James R. Keene, vice-president; Henry Keene, secretary; W. H. Guion, E. N. Dickerson, jr., E. J. Jermanowski, C. W. Griswold, Jacob D. Vermilye, John Sloane, and William H. Gebhard, directors. The company has purchased, from the Cutting estate, two blocks of ground, lying between 39th and 41st streets, and from 1st avenue to the East river. It is reported that a contract for building the works has been entered into with Henry J. Davison. It is stated that the new works will be in a position, when in complete working order, to supply 2,000,000 cubic feet per day, and the idea is to furnish gas to private consumers at the rate of $1.75 per thousand, while gas will be sold to the city at $1.50. Our erstwhile famous "Comstock lode" manipulator, Mr. Keene, is a man of great versatility; but the self-same gentleman may find it a trifle harder to earn dividends in New York, while engaged in the manufacture of gas, than it was to levy assessments in Nevada on worthless mining properties. Perhaps he thinks there is some paying quartz left in the New York city gas vein!

PRICE OF GAS AT COLUMBUS, OHIO.—As an instance of cheap gas no better locality than Columbus (Ohio) need be cited; here are the figures: To private consumers, $1.30 per thousand; to the city, $1.15; this had ought to be a bad spot for kerosene, *et al.*

WAS THIS WATER GAS?—He came home late the other night, and his wife, who had been patiently awaiting his arrival, silently watched his manœuvers. When he had lighted a match and applied it to the cold water tap over the marble basin, she thus softly expressed herself, "James," she said, "that is not the gas burner." "I know it now, my love," he replied unsteadily; "fact is, I've been overworked, and that is the reason I made the mistake." "Yes, you look as though you had been lifting a good deal," was the quiet response. Curtain.

MR. ANDERSON TO DO THE WORK.—At the meeting of the Committee on Light of the Richmond (Va.) Common Council, held Tuesday, May 15, it was resolved to award the contract for remodeling the gas works to Mr. Anderson, of the firm of Taylor & Anderson. His bid was $12,523. Work will be begun at an early date.

TWENTY-SEVENTH ANNUAL REPORT OF THE ST. CATHARINE'S & WELLAND CANAL GAS LIGHT COMPANY.—This company has just made public the report of its operations during the last fiscal year ending February 28, 1883. From it we learn that the quantity of gas made was 11,547,900 feet, being an increase of 449,000 feet over the make of the previous year. The gro s earnings were $31,507.12, as compared with $26,890.16, showing an increase of $4,616.96; the ordinary expenses for the year were increased by the sum of $1,080.44; the net receipts for same period were $15,929.11, as against $12,392.59.

During the year two dividends of 4 per cent. each, or $9,493.33, have been paid, and the balance of earnings $6,435.78 carried to profit and loss, leaving at the credit of that account $20,659.16. At a special meeting of the shareholders held on April 12, 1882, authority was given to issue $50,000 new stock to carry out the enlargement of works necessary to light the new canal, of this amount $30,000 has been issued. The outlay on the new works to date has been for extension of mains $34,664.49, and new coal shed $964.18.

It is estimated that the expenditure this year for new machinery, etc., will be about $12,650, which it is expected can be met by the means now on hand, and the surplus profit for the year over ordinary dividends; should it, however, be found advisable to construct a new gas holder, further stock must be issued.

NEW HOLDER FOR THE BUFFALO MUTUAL GAS LIGHT COMPANY.—The Buffalo Mutual Gas Light Company, of Buffalo, N. Y., have just awarded a contract to Stacey Manufacturing Company, of Cincinnati, Ohio, for the building of a new telescopic gasholder.

AMERICAN INSTITUTE OF MINING ENGINEERS.—The summer meeting of the American Institute of Mining Engineers is to be held in Virginia, beginning at Roanoke on Monday evening, June 4.

A NARROW ESCAPE.—Annie E. Lucas and Sarah Rue, daughter and niece of Joseph S. Lucas, of 272 Light street, Baltimore, Md., narrowly escaped death from suffocation on the morning of May 15. They are employed at the works of the Gandy Manufacturing Company, at No. 13 Hollingsworth street, in the same city, which is at some distance from their home, and are consequently obliged to rise very early. On the date in question, the usual summons to wake them was given, but no response was made in answer to it. The door was forced open, and the girls were found unconscious. Dr. Noble, who was immediately summoned, succeeded, after some time, in reviving both. The gas was discovered to have issued from a leak in one of the pipe joints. The room is a small one and the windows were all closed.

ELECTRIC LIGHT FOR SCRANTON, PA.—A charter has been issued to the Scranton Electric Light Company; the capital of the concern is $50,000, and Samuel Amerman has been elected president. This is the company whose first charter was contested by a rival organization.

Messrs. Park and Noble Re-elected.—Chief Engineer William K. Park, of the Philadelphia (Pa.) Gas Trust, was retained in his position by the unanimous vote of the trustees. A similar result was reached in the case of Registrar Thomas Noble.

Not Yet Settled.—The Consolidated Gas Company, of Baltimore, Md., have a contract (with several years to run) with the city by which the gas company is bound to supply gas for public purposes at $1.85 per thousand; the contract also contains the clause that the company shall expend the sum of $10,000 annually in the extension of its mains. In consequence of the existing war of rates, with gas at $1.00 per thonsand, it was to be supposed that the city would endeavor to get its supply at the lower figure, and steps were taken towards the attainment of that end. The Consolidated Company agreed to furnish the city with gas at $1.00, provided the authorities would cancel the clause requiring them to expend the $10,000 annually for the purpose before specified. The City Solicitor takes the ground that the city has a perfect right to cancel the old contract, claiming that the arrangements made by previous Councils are not binding upon their successors.

Milwaukee (Wis.) one of the Objective Points.—"Eastern capitalists" appear to be very much in favor "out West" at the present time. They (the capitalists) want to get around the provisions of the charter of the Milwaukee Gas Light Company, as witness the following from the *Sentinel* of that place;

"It is an open secret in aldermanic circles that there is a project on foot for the establishment of a new gas company in this city, and great hopes are entertained that competition will result in a reduction of prices. Eastern capitalists are now in the city with this purpose in view, and an application will be made at the next Council meeting for a charter. The charter of the Milwaukee Gas Light Company covers a period of ninety-nine years, and its terms provide that no other gas company be granted a charter during its term of existence. The frequent Supreme Court decisions which have overturned the effective force of such provisions will be quoted to show the Council that it possesses the authority to grant a charter to a second gas company."

The Western Alderman appears to possess the same characteristics as those which have made his Eastern brethren celebrated.

Better News from Mr. Price.—Mr. G. A. Hyde, in a recent letter to the Journal,, conveys the pleasing information that Mr. Price is improving.

The History of the Atlanta Grab.—In our last we promised to give the history of the Atlanta (Ga.) "grab," but on account of the pressure on our columns we are obliged to let it go over for this number.

Ferry Boats and Gas Tanks.—Mr. William H. Martin, chief-engineer of the Union Ferry Company, of Brooklyn, New York, was interviewed recently as to what steps had been taken by him in the matter of the objections raised by the local steamboat inspectors to the present method of storing the gas used for the illumination of the boats. Mr. Martin said:

"All the boats of this company have the gas tanks in the hold, at the opposite end of the boat from the boilers. The gas tank is sh t off from the rest of the hold by a bulkhead. The boats of the New York Ferry Company have their gas tanks also placed in the hold. At the conference with inspector Starbuck yesterday we told him that it would require the expenditure of a large sum of money to place gas tanks on the hurricane deck, for it would be necessary to erect boilers and pumping stations at each of the five ferry-houses in Brooklyn where the boats of our company land; and, unless the gas was compressed in very strong iron tanks, the space required on the upper deck would be so great that it would look bulky. We told him that we would submit plans which we hope will be satisfactory. Our plan is to build a square iron tank about these gas tanks. This iron box will be air tight, with three vent pipes. Two of the pipes will run out on either side of the hull under the guards, and the other will extend through the engine room, and thence pass out through the upper deck. I think this plan will satisfy the inspectors. The Pennsylvania Railroad Ferry Company can use their tanks on the upper deck, for at the ferry-house they have the necessary power to compress the gas and force it into the tanks."

When asked why the company did not try electricity in lighting its boats, Mr. Martin replied: "Because we have not yet seen a system which is perfect and trustworthy for our use. A number of companies have made offers to light one of our boats, and permit us to use their plant for 30 days on trial, but in each case they say that it will not be best to take out the gas until the system works more perfectly. I have told each of these gentlemen that I would not recommend their system unless they had sufficient confidence to rely upon it implicitly. I think the electric light is to be preferred to gas; but, as I have said, we want something that can be depended upon. The Board of Directors are now discussing a system of electric lighting, and possibly may determine to try it upon one or more of the boats. The boats of the Pennsylvania Road, which are lighted by electricity, carry a supply of gas for use in an emergency.

"The licenses for boats of the Union Ferry Company do not expire until the 1st of July next, and I think our new plan will be approved, and if it is we will have plenty of time in which to make the necessary alterations on all the boats."

The Way that the Philadelphia Gas Trust was "Salted."—The shipments of gas coal under the contract awarded by the Gas Trust officials last March to the Saltsburg Coal Company, whereby the latter cancern was to supply 105,000 tons of coal, at figures ranging from $4.59 to $5.34 a ton, have been stopped. Chief-engineer Park instituted a series of experiments looking to a thorough testing of the value of this coal as a gas producer; the results of the tests were so unfavorable that it is more than likely measures will be taken to cancel the contract. The statement is made that the Saltsburg coal was found to be worth from 60 cents to $1.00 per ton less than other standard grades of coal employed in the manufacture of gas.

But what is to be expected of men, however competent they may be to collect news-items (would-be recorder Smith, for instance) for a daily paper, who embark in business of which they know absolutely nothing, and who will not take council or advice from those able to give it. The Saltsburg people have stated to the Trust officials that they are about to commence mining coal from another one of their mines, and assert that it will be found to fill the bill completely. It is a wonder that they did not send this grade of their product at first.

Detroit will not Have Them.—President Lewis's pamphlet (no obscurity about paternity here) appears to have done some effective work. The Committee on Gas and Ordinances of the Detroit Council, after hearing all the arguments offered by both sides as to whether the United Gas Improvement Company should be allowed to go ahead in the matter of establishing a gas works in Detroit or not, unanimously decided to report that it does not appear that the company is organized under the State law, and as the matter of tearing up the streets for the purpose of laying new mains is a very important one, they did not feel justified under the circumstances in reporting in favor of granting the prayer of the petition, and they therefore recommend that it be denied.

When the report was presented in the Council it was adopted by a unanimous vote, without a word of debate. Good for the Detroit Council.

He did not Die.—J H. Brinton, of Hepler, Kansas, arrived at Columbus, Ind., on the night of May 8. He took quarters at the St. Denis Hotel, and was assigned to room 21. Early next morning a strong smell of gas was noticed in the corridors of the hotel, and the escape being traced to room 21, the door was forced open and Brinton found in a partially unconscious state. After considerable effort he was aroused, and explained that, on retiring for the night, he had blown out the gas. To use his own words, "He had an awful hard time in blowing that light out, but finally made her." Gas is made from coal at Columbus, Indiana.

The Market for Gas Securities.

The city market for gas securities has exhibited, during the past fortnight, the same dull and heavy tone which prevailed at the time of writing on May 16. The only exception to this statement may be taken in the case of Mutual gas, which, with but little or no stock offered for sale, has advanced in the bid price from 113 to 116; it may be stated, however, that one or two small transactions in this security are reported the price paid being 116¼. Manhattan gas is quoted at 233 to 236; this company has just declared a dividend of 5 per cent., the dividend being made payable June 1. Harlem gas holds its last quotation fairly well. The situation in New York may be fairly summed up as dull and steady.

Brooklyn, New York, gas securities have been more active, but with a tendency to low figures. Brooklyn gas is quoted at 107 to 110; Citizens gas, 75 to 80; a fair figure for Nassau gas would be 65. Fulton Municipal is weaker and lower, in fact the quotation for this security shows a smaller figure than has been recorded for some time back; the stock is offered at 71, and 69 is bid. Williamsburgh gas is steady to strong; the annual meeting of the directors of this company will be held on Monday, June 4. Those who possessed small holdings of Williamsburgh stock, and who allowed themselves to be frightened out of their shares by the "disinterested" and "benevolent" people in charge of the "patent gas deal" across the East River, probably wish now that they had not been so easily persuaded to part with their property.

In out-of-town shares we quote Jersey City gas at 155 to 165; Hartford gas, 108 to 112; Consolidated gas, of Baltimore, Md., weakened in price, and very materially in tone, on the announcement of the negotiation of a loan of $1,000,000 by the Equitable Gas Company, and that the funds would be used for the extension of its plant, etc. San Francisco, Cal., gas securities are higher; Detroit gas is stronger, the opposition scheme being defeated. St. Louis (Mo.) shares are in an unsettled state; we note some improvement in Laclede gas; St. Louis gas is weaker.

THE AMERICAN
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A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—

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SATURDAY, JUNE 2, 1883.

The Marseilles Meeting of the French Association.

The Marseilles meeting of the French Association of Gas Engineers, held on the 2d, 3d, 4th, and 5th days of May, was a very complete affair. Thirty-five communications, on technical subjects, were presented for the consideration of the members; 38 new names were added to the rolls, making a total membership of all classes of 453. The officers elected for the ensuing year were the following: President, M. Marche; Vice-President, M. Breittmayer; Secretaries, MM. Cornault and Alavoine; Treasurer, M. Vee.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks (with W. B. SCOTT & CO.,)
34 PINE STREET, NEW YORK CITY.
JUNE 2, 1883.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Central	$466,000	50	85	90
Harlem	1,800,000	50	97	100
" Bonds	170,000		—	—
Manhattan	4,000,000	50	239	236
Metropolitan	2,500,000	100	187	189
" Bonds	658,000	—	105	110
Mutual	3,500,000	100	116	118
" Bonds	1,500,000	1000	103	105
Municipal	3,000,000	100	180	182
" Bonds	750,000		102	104
New York	4,000,000	100	120	125
Northern	125,000	50	—	95
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	110	112x
Citizens	1,200,000	20	75	80
" S. F. Bonds	320,000	1000	105	107
Fulton Municipal	1,500,000	100	70	80
Peoples	1,000,000	10	48	52
" Bonds	290,000	—	104	107
" "	250,000	—	88	90
Metropolitan	1,000,000	100	80	85
Nassau	1,000,000	25	59	—
" Ctfs	700,000	1000	90	93
Williamsburgh	1,000,000	50	70	75
" Bonds	1,000,000	—	100	101
Richmond Co., S. I.	300,000	50	70	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	72	75
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	80	85
" " Bonds	124,000	—	105	10
Chicago Gas Co., Ills.			150	155
Cincinnati G. & C. Co.			178	180
Consolidated, Balt.			41	42
" Bonds			105	106
Central, S. F., Cal.			35	—
Capital, Sacramento, Cal			—	55
Hartford, Conn	750,000	25	118	122
Jersey City	750,000	20	155	165
Laclede, St. Louis, Mo.	1,600,000	100	90	95
Montreal, Canada	2,000,000	100	186	187
New Haven, Conn		25	144	—
Oakland, Cal			—	30¼
Peoples, Jersey City		—	72	75
" " Bonds			—	—
Paterson, N. J.		25	96	99
Rochester, N. Y.		50	70	80
Washington, D. C.	2,000,000	20	—	180x
Wilmington, Del.		50	174	—
Yonkers		50	30	32
St. Louis, Missouri	600,000	50	250	254
San Francisco Gas Co. San Francisco, Cal.			56¼	56¾

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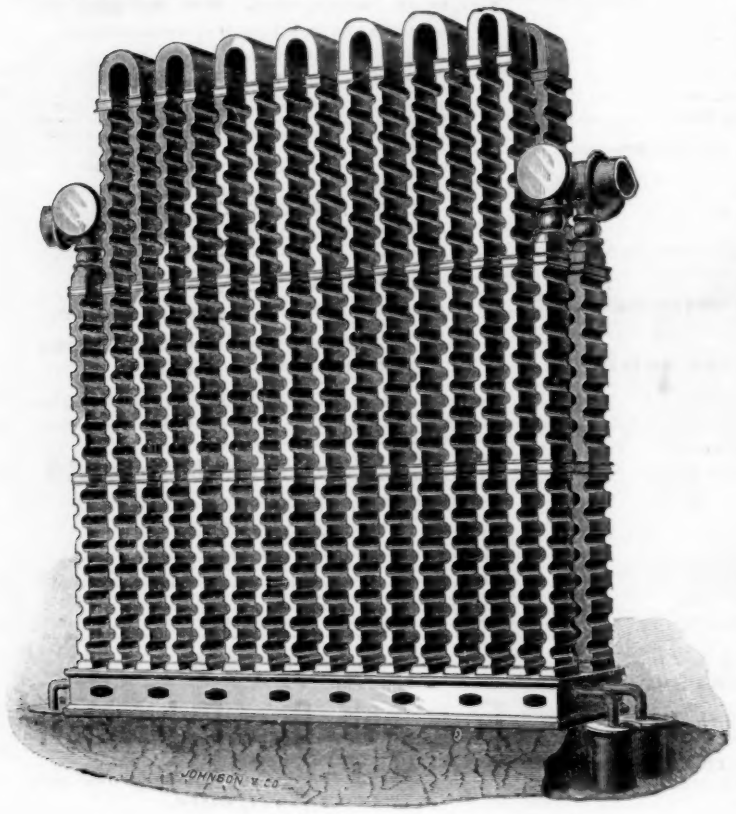

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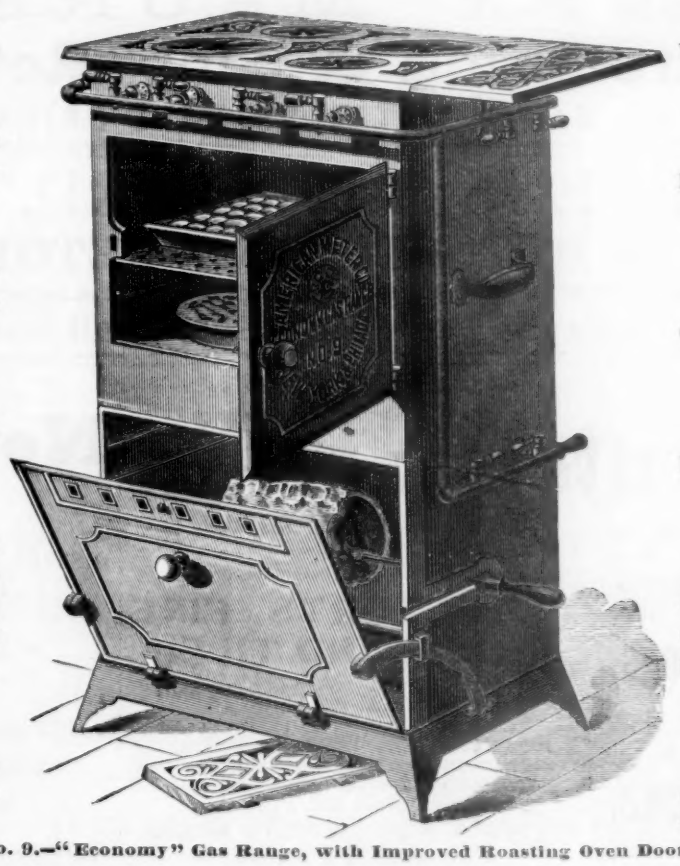

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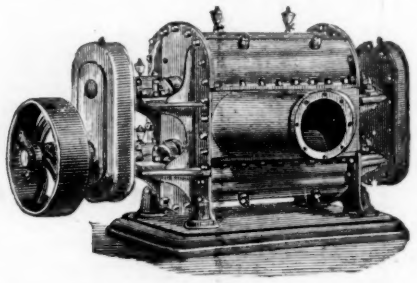

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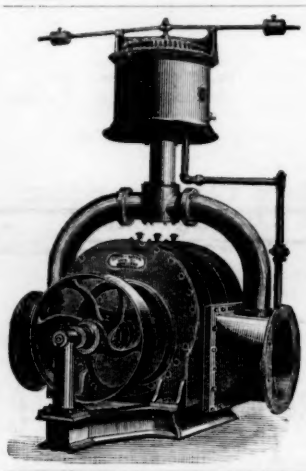

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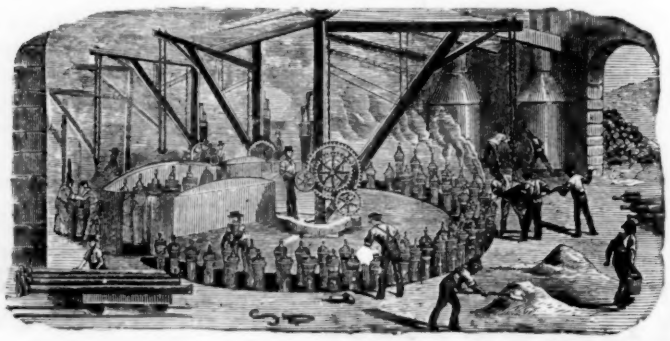

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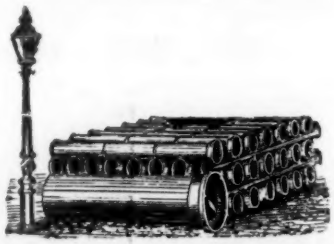

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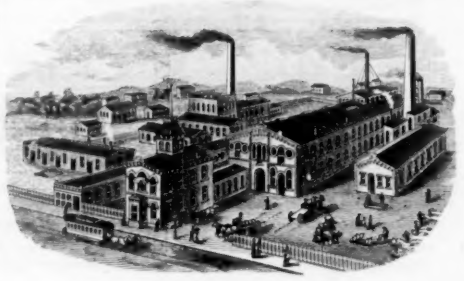

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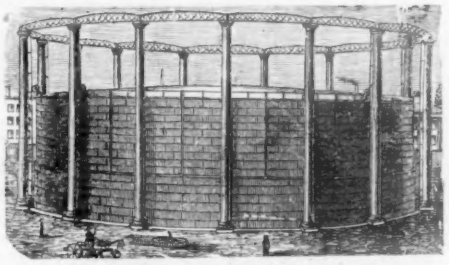

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Messrs. KIRKHAM and HERSEY: LEEDS CORPORATION GAS OFFICES, BOAR LANE, LEEDS, Oct. 3, 1881.

Gentlemen:—In reply to your inquiry of the 1st, I have pleasure in informing you that our income from Ammoniacal Liquor is more than 3s. (72 cents) per ton of coals under present contracts. (Signed) H. WOODALL.

Messrs. KIRKHAM, HULETT and CHANDLER, Limited: THE GAS LIGHT AND COKE COMPANY, KING'S CROSS, Oct. 10, 1881.

Gentlemen:—In reply to your inquiry, I beg to say that the "Standard" Washer-Scrubbers erected at this station continue to give me full satisfaction. No. 1, which was put up in October, 1879, has been in constant use from that date without costing anything for repair, nor has the machine needed cleaning out. The No. 2 Washer, erected in 1880, has also worked quite satisfactorily. (Signed) JOHN CLARK, Engineer.

Messrs. KIRKHAM, HULETT and CHANDLER, Limited: WATER AND GAS COMMISSIONERS' OFFICE, INVERNESS, Nov. 3, 1882.

Dear Sirs:—In answer to your inquiry of the 1st. inst., I have much pleasure in stating that the "Standard" Washer-Scrubber erected by you at our works is giving every satisfaction. Clean water run in at the outlet is converted into 24-oz. liquor. There are in all seven chambers, and the gas tested with turmeric paper at the sixth chamber shows no trace of ammonia. It requires very little engine power, and gives about nine-tenths of an inch back pressure. Our purifiers are purifying one-third more gas with the same quantity of lime. It is also a great relief to the men who empty the purifiers, as the disagreeable smell arising from the ammonia is entirely done away with. (Signed) JAMES THOMSON.

Messrs. KIRKHAM, HULETT and CHANDLER, Limited: DUKINFIELD, DENTON, AND HAUGHTON GAS WORKS, DUKINFIELD, Sept. 27, 1882.

Gentlemen:—Now that I have had a longer experience of your "Standard" Scrubber-Washer, I can give you, with greater confidence, the results derived from its use. In 1876 we made 138.2 lbs. of crude Ammoniacal Liquor per ton of coal carbonized; last year we made 235.7 lbs., or an increase of 70 per cent.; the strength of the former was probably 4°, of the latter it was 6.5°. The income from the Liquor in the former year was £320, last year 1,190, an increase of £870, or at the rate of 270 per cent. This increased income is, of course, partly due to the higher price of Liquor, but it is mainly owing to the increased strength and quantity through the use of your "Standard" Scrubber-Washer. Such figures as I have given speak more forcibly than any expression of opinion. (Signed) HARRISON VEEVERS.

THOMAS HERSEY, Esq.: THE GAS LIGHT AND COKE COMPANY, BECKTON, NORTH WOOLWICH, Feb. 2, 1882.

Dear Sir:—I send you on the other side some recent experiments that we have made with your Washers, and I am happy to say that they continue to give me satisfaction, as we are enabled, with very little trouble, to keep up the strength of our Liquor. (Signed) G. C. TREWBY.

Results of 12 *hours' Experiments on Nos.* 4, 5, *and* 6 *Washers, Dec.* 24, 1881; the gas being allowed free access to each of the Washers:

Gas passed	1,800,000 cubic feet = 175 tons coal.	As follows:	No. 4	1,125 gallons of 18.1 oz.	1 clean chamber
Water used	2,405 gallons = 13.7 gallons per ton.		No. 5	564 " of 11.3 oz.	2 "
Liquor produced	2,405 gallons of 15 oz. strength, average.		No. 6	716 " of 13.2 oz.	2 "

These Machines are now manufactured from 25,000 feet to 200,000 feet capacity per day.

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SOLE AGENT FOR THE WESTERN HEMISPHERE.

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CIRCULAR TO GAS LIGHT COMPANIES.

BRANCH OFFICE OF THE STRONG GAS FUEL AND LIGHT COMPANY,
CORNER BROADWAY AND MAIN STREET, YONKERS, July 2, 1881.

The YONKERS FUEL GAS COMPANY is now in successful operation, manufacturing Water Gas by the STRONG PROCESS, for HEAT, POWER, and LIGHT.

It has about two and a half miles of mains already in use through the heart of the city of Yonkers, and is supplying gas for cooking, heating, and various industrial purposes.

The problem of a purely fuel gas is at length practically solved, and is a complete success. That it must speedily go into universal use is apparent to everyone.

Gas Light Companies are cordially invited to visit Yonkers and inspect this new system, which, if electricity *should* eventually drive them out of the field of illumination, will open to them another field still more vast and fruitful, and from which they never can be dispossessed. The Westchester Gas Light Company of the city of Yonkers employes the Lowe Process for making its gas. Here, then, can be seen, side by side in business competition, the Strong and the Lowe against the Motay and the old coal gas methods, and each observer will be enabled to form his own opinion as to their relative power and value. The STRONG GAS FUEL AND LIGHT COMPANY is the proprietor for the State of New York of the Strong Patents, five in number, and of the Lowe Patents, two in number. All applications for licenses or for information should be addressed, as above, to

R. W. VAN PELT, *President of the Company,*
And also President of the Yonkers Fuel Gas Co., and of the Westchester Gas Light Co.

THE GAS ANALYST'S MANUAL.

BY F. W. HARTLEY, A.I.C.E., M.S.E. **E. & F. N. SPON, PUBLISHERS.**

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Attest—J. L. CAMPBELL, Secretary, pro-tem. Signed—A. T. GOSHORN, Director General J. R. HAWLEY, President

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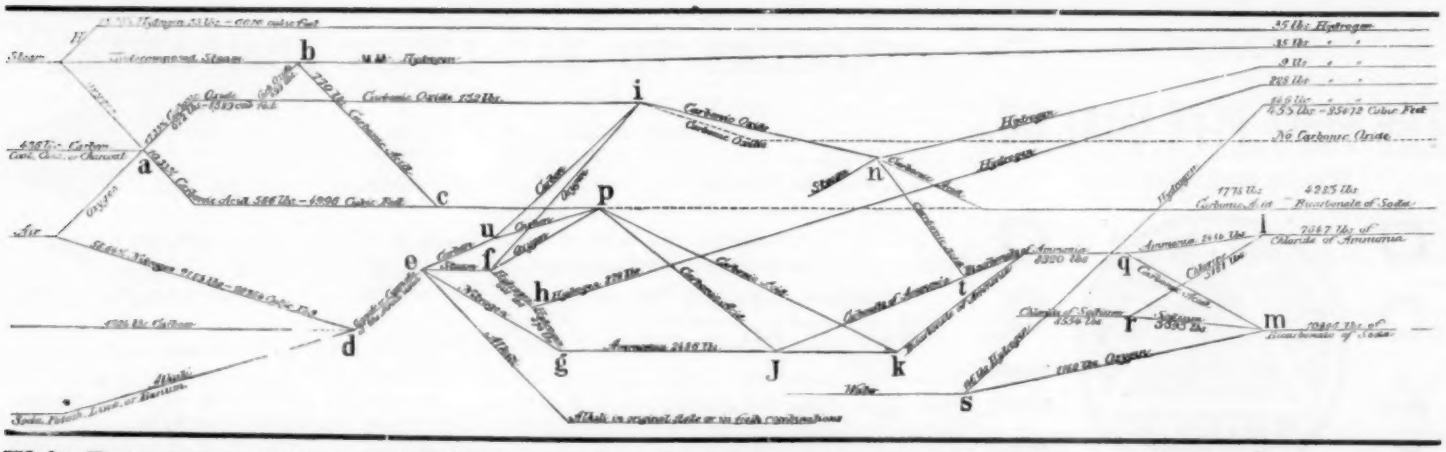

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Enables every Gas Consumer to ascertain at a glance, without any previous knowledge of the Gas Meter, the quantity and money value of the Gas consumed. Also the best method of obtaining from Gas the largest amount of its light.

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ALL FITTINGS ARE NICKEL-PLATED WITHOUT EXTRA CHARGE.

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OVER THIRTY FIVE THOUSAND STOVES OF ALL SIZES SOLD SINCE 1878.

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